The Relation between Profession Development and Job (Re)Design:

The Case of Dental Hygiene in the Netherlands

Katarina Jerković-Ćosić

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The Case of Dental Hygiene in the Netherlands

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	Prof. dr. R.M.H. Schaub

Voor Miro, Millena en Luka

Voorwoord

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Katarina Jerković-Ćosić

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Introduction

1.1 General introduction

The imbalance between demand and supply in Dutch healthcare led to the introduction of task redistribution at the beginning of the 21st century. Some new occupations arrived, and many, especially occupations in allied healthcare, underwent major changes in scope of practice and authorization. One example is dental hygiene, which is the field of study chosen for this thesis. In this general introduction, we first present the external legitimation and then the internal legitimation for this study.

In the 1990s, future scenarios for oral healthcare predicted high capacity problems due to a skewed age distribution in the dentist population (Stuurgroep toekomstscenario's in gezondheidszorg - STG, 1992). Researchers had estimated that approximately one million people in the Netherlands would not be able to receive oral healthcare by 2010 due to the scarcity of dentists. Therefore, in 2000, the committee Capacity in Oral Healthcare was installed to investigate the nature, gravity and magnitude of the capacity shortage and to produce solutions to both solve capacity problems and address the higher expectations of oral healthcare. An adjusted task distribution over dental health occupations was put forward as part of the solution (The Committee for Capacity in Oral Healthcare, 2000).

Even prior to 2000, an increasing scarcity of dentists had already led to a substantial informal transfer of tasks from dentists to dental hygienists (Raad voor Volksgezondheid & Zorg – RVZ, 2002), and three major driving forces behind task redistribution were identified. The first was a range of technological innovations that were coupled with higher expectations on the demand side. With technological innovation, more specialist care is required, and higher expectations are created. Dentists are expected to perform more specialist care; therefore, they lack the time to perform their routine tasks, which can be transferred to dental hygienists. The second force was the need for further professional development of oral healthcare practitioners (Nederlandse Maatschappij tot bevordering der Tandheelkunde - NMT, 2002). These practitioners seek opportunities to enrich their jobs by changing the scope of their job, prevent burnout and remain satisfied with their careers. Finally, growth in larger dental practices stimulated the demand for changes in the traditional task division and led to investments in teamwork and

task redistribution (Johnson, 2001; Bruers, van Rossum, Felling, Truin & van't Hof, 2003).

Following the recommendations of the committee Capacity in Oral Healthcare, the government introduced changes in the educational and legal system to formalize and stimulate further task redistribution. At that time, in 2000, Dutch dental hygiene education consisted of a three-year curriculum and covered the following subjects: prevention, periodontology, basic caries diagnosis, sealants, correction tasks, anesthesia and x-rays. In 2002, this curriculum was extended to a four-year bachelor program, which offered additional competencies in both the diagnosis and treatment of caries and applied research. The legal regulation of the restyled profession was based upon the competencies achieved during this accredited four-year program. Since May 2006, dental hygienists have been *directly accessible*, which means that a patient is no longer required to have a referral from a dentist to see a dental hygienist (VWS, 2006). Unfortunately, there is no information available about the extent to which these changes in education and the legal system affected the actual dental hygienist's scope of practice and the introduced task redistribution. Thus, from a practitioners' point of view, it was relevant to investigate the actual task redistribution between dentists and dental hygienists.

The extension of education to a four-year curriculum and the accompanying changes in legislation were meant as governmental stimuli for more task redistribution in oral healthcare. Initial signs, however, seemed to show that these changes were insufficient for more radical shifting. One German study demonstrated that, after changes in the organization of healthcare, which included shifting tasks between occupations, governmental policies provided little incentive for the reduction in medical dominance and better cooperation between professions with an asymmetric power relationship (Di Luzio, 2008). This asymmetric power relationship, or medical dominance, is also present in the relationship between Dutch dentists and dental hygienists.

Task redistribution and the extension of Dutch dental hygienists' scope of practice are based on the shifting of routine tasks from dentists to dental hygienists. We argue that this process of task redistribution depends on several factors, including a dentists' willingness to shift routine tasks to dental hygienists. Two Dutch research reports revealed that task shifting by dentists to other occupations is dependent on dentists' personal attitudes, their view of the dental hygienist's performance and the dentist's treatment philosophy (Uitenbroek, Schaub, Tromp & Kant, 1989; Bruers et al., 2003). Moreover, a study in Indiana, USA, showed that the dentist's year of graduation appeared to be a significant factor for the extent to which dentists employed dental hygienists and shifted tasks to dental hygienists (Cooper, 1993). Recently graduated dentists were more likely to employ dental hygienists and shifted more tasks to this occupation. In Dutch research on task redistribution, little attention has been paid to the actual process of task redistribution and factors that affect its occurrence and magnitude. Thus, professionals do not know the

precise conditions under which changes in education and legislation lead to local changes in work structuring and task division.

The Council for Public Health and Healthcare has argued that task redistribution is an irreversible process that has positive effects on healthcare in general (RVZ, 2002). Considering the effects of task redistribution, most research has concentrated on possible consequences for healthcare capacity and costs. Little attention, however, has been paid to the possible consequences of task redistribution for personal development, job satisfaction and career satisfaction of the professionals involved. For dental hygienists, extending the scope of practice is generally regarded as a positive career challenge that will allow them to develop and utilize new competencies (The Committee for Capacity in Oral Healthcare, 2000; RVZ, 2002; van den Heuvel, Jongbloed-Zoet & Eaton, 2006); however, this is an assumption that must be verified. For example, one study of nurse practitioners (who have a similar role as dental hygienists in their respective field) demonstrated that their job satisfaction was high in the first year of work, but it steadily fell with each additional year of experience (Kacel, Millar & Norris, 2005). Thus, we were curious about the effects of task redistribution on dental hygienists' job satisfaction and professional development.

From a practitioner's perspective, we aimed to investigate the actual task redistribution between dentists and dental hygienists in the Netherlands, the conditions (in terms of organizational and individual characteristics) under which the change in the legitimate scope of practice leads to changes in the tasks of individual professionals and how such changes affect a dental hygienist's job satisfaction. We argue that task redistribution will only work if new practitioners are able to develop their competencies, integrate their professional role into a flow of work, build up job satisfaction and maintain this satisfaction over time. To be effective, we expect the proposed solutions to this practical task redistribution puzzle to have a number of stipulations, some of which are explained by existing theories. In the present case, solutions require positive outcomes in the sphere of the job satisfaction of practitioners, which leads to retention of the practitioners in a practice and in the occupation and a smooth transfer of tasks between occupations and workflow integration in practices. Although there are several theories as to whether these conditions are fulfilled, these processes must be analyzed. Indeed, the theories themselves are open to questioning because they are controversial. Furthermore, one can never be sure whether theories work in a context for which they were not built or examined.

Our research questions, which address both theory and practice, assess a complex practical problem and examine the pertinence of theories that shed light on the adequacy of the solutions adopted. We aimed to improve existing theories to better explain how and why practical solutions work or do not work.

There is an established and acknowledged theory on how job redesign affects job satisfaction; Hackman and Oldham's Job Characteristics Model (JCM), but societal and local conditions are neglected here (Hackman & Oldham, 1980; Fried & Ferris, 1987; Boonzaier, Ficker & Rust, 2001). The implementation of redesign is affected by institutional interests of established professions within individual practices because of local constellations or factors and in the entire field of practice. Here we draw on the work of Abbott (1988), who argues that professional occupations are not formed independently of one another but develop in relation to one another. More specifically, professional occupations are formed by constantly fighting over jurisdiction in respective professional domains. Based on this idea of interdependency between occupations and fights over jurisdiction, the contextual approach of Abbott was chosen as a framework to generate further insight into which factors/processes are responsible for the extent to which dentists delegate tasks to dental hygienists. Although the analysis of Abbott (1988) is restricted to the societal level, the emerging choices in task division and task delegation at the organizational level will influence the resulting task redistribution between occupations at the societal level. This interaction between the societal level, with its professional conflicts and professionalization processes, and the organizational level has not received much attention in the professionalization literature. Thus, the present study was designed to address this knowledge gap. We aimed to complement Abbott's view on the competition at the level of occupations as a whole with an analysis of the contribution of local organizational and individual factors that may be of importance in how scopes of practice develop.

The organizational conditions affecting job redesign and job satisfaction have not been specified other than as *context satisfactions* in Hackman and Oldham's JCM (1980), which describes how job redesign affects job satisfaction through perceived job complexity. We used the JCM to examine the task redistribution on the individual level and to investigate its effects on the professionals involved. Furthermore, the conditions under which job redesign is realized were integrated into the JCM to better explain the practitioner's perceived job complexity and job satisfaction. In terms of performance and job satisfaction, the relationship between perceived job characteristics/job complexity and performers' outcomes have often been studied, but the relationship between the actual job content (scope of practice) and the perceived job characteristics has received less attention in the JCM literature. Studies have not shown the sustainability of the JCM over time (i.e., how satisfaction persists with routinization). Moreover, previous studies have reported inconclusive findings about the stability of the JCM factor structure with its five core job characteristics. The contradictory evidence suggests that the internal coherence of the JCM must be examined. Changes in job content might affect the cognition-based factor structure. Thus, we wanted to investigate the extent to which the structure of perceived job characteristics is stable under the condition of changes in job content. In addition, we wanted to examine how dental hygienists

with different job contents perceive job characteristics and the relationship between changed job content and perceived job characteristics and job satisfaction.

1.2 Field of study

This section describes the setting of our research: the Dutch oral healthcare field. General information about oral healthcare in the Netherlands is given, and the different occupations are briefly introduced. The dental hygienist occupation is described in more detail due to our focus in this research. In the last section, the history of developments regarding task distribution is introduced.

1.2.1 Dutch oral healthcare

1.2.1.1 Oral healthcare occupations

Dutch general oral healthcare is provided by 8,881 dentists, 2,425 dental hygienists, approximately 3,000 prophylaxis assistants and 16,500 assistant personnel (Capaciteitsorgaan, 2010; Den Dekker, 2008).

The very first Dutch school for dentists was established in 1913 and consisted of a four-year curriculum. In 1947, dentists secured an academic degree, and a new six-year curriculum was initiated with chances for the introduction of scientific research in the education. This curriculum, however, was reduced to a five-year program in the mid-1970s. Dutch dentists bear responsibility for the complete oral health of the population. Currently, dentists perform three main roles: doctor, academic and care provider (Den Dekker, 2008). The Dutch Dental Association (Nederlandse Maatschappij tot bevordering der Tandheelkunde - NMT) was established in 1914. The membership is not compulsory, and approximately 80 percent of all dentists in the Netherlands are members.

The dental hygienist occupation was introduced in the late 1960s. Dental hygiene is considered as care provision for the prevention of diseases in teeth and other oral tissues. During the 45-year development of dental hygiene, many changes in education and legislation have occurred, which will be discussed in more detail in the next section.

Prophylaxis assistant is not a separate occupation; these are dental assistants who are educated in an approximately eight-day course on preventive treatments and oral hygiene support. These courses have only existed since 1995. Because many private courses for prophylaxis assistants are available, it is difficult to determine the exact number of prophylaxis assistants in the Netherlands.

Dental assistants receive an intermediate vocational education, although 60% of assistants working in dental practices are not educated as dental assistants (Den Dekker, 2008). Dental assistant duties mainly consist of assisting in certain tasks

and performing some tasks in direct patient care, such as taking dental impressions and x-rays.

1.2.1.2 The practices

Most dental care is provided in general dental practices, which are largely owned by dentists who may employ other dentists, dental hygienists, assistants and/or other personnel. Special care in periodontology, orthodontics and dental implants are mostly provided in specialist practices. There are different dimensions for the classification of general practices. In our research, we used two types of classifications. The first type classifies general dental practices by the kind of enterprise. Using this point of view, Den Dekker (2008) distinguished three types of practices:

- Type I: solo practice with one dentist who is the practice owner;
- Type II: practice with one dentist who is the owner and one or more employed dentists;
- Type III: cooperative practice with two or more dentists-owners, with or without other dentists in employment.

Of all dentists, 75% work in a Type I practice, 9% in a Type II practice and 16% in a Type III practice.

The second dimension for classification was the degree of task distribution. Using this point of view, the NMT (Institut voor Onderzoek van Overheidsuitgaven - IOO, 2009) distinguishes the following types of dental practices:

A. Dentist(s) only, no task delegation to dental hygienist or prophylaxis assistants (4%);
B. Dentist(s) delegating to prophylaxis assistants (9%);
C. Dentist(s) delegating to dental hygienists in the same practice, with no delegation to prophylaxis assistants (10%);
D. Dentist(s) delegating to dental hygienists and prophylaxis assistants in the same practice (18%);
E. Dentist(s) delegating to dental hygienists in another practice (or dental hygiene practice), with no delegation to prophylaxis assistants (38%);
F. Dentist(s) delegating to dental hygienists in another practice (or dental hygiene practice) and delegating to prophylaxis assistants (21%).

The scope of dentists' responsibilities has been well described. The *Data Stations Project,* biannual study of the Dutch Dental Association, has provided (since 1995) data on the type and magnitude of dentists' care, practice organization and dentists' views on actual matters. Far less information is available on dental

hygienists' scope of practice and the ongoing task redistribution between these two professions. In this research, we concentrated on the scope of practice of dental hygienists, their relationship with dentists regarding task redistribution and the consequences of task redistribution for dental hygienists' work and personal outcomes. In the next section, we provide background information on the history, professionalization process and changes in the scope of practice of Dutch dental hygienists. The concept of task redistribution between dentists and dental hygienists and all related terms are introduced in Chapter 1.2.3.

1.2.2 Professionalization of Dutch dental hygiene

The birthplace of dental hygiene as an occupation is the state of Connecticut, USA. In 1906, the first dental hygienist was educated by a dentist convinced that some dental diseases could be prevented by preventive dental cleanings. This dentist began the very first school of dental hygiene in 1913. According to the figures of the Bureau of Labor Statistics (BLA) in the USA, dental hygienists are listed among the top ten fastest growing healthcare occupations, and the current population of over 150,000 dental hygienists has been predicted to grow by 30% by 2016. (http://www.cdhardh.com/home/historyofdentalhygiene.html). Furthermore, the dental hygienist profession was listed in the top ten best jobs in the USA according to the World Street Journal (World Street Journal, 2010). Job satisfaction among dental hygienists in different countries is quite high, and there is little variation across countries. In the USA, between 70 and 99% of dental hygienists are satisfied with their job (Boyer, 1990). In addition, 70% of Swedish dental hygienists are highly satisfied with their jobs (Ylipää, Arnetz, Preber & Benko, 1996). In the Netherlands, dental hygiene is the second best-paid occupation among professions in applied science (Keuzegids Hoger Beroepsonderwijs – HBO voltijd, 2011).

Knowledge about the history and professionalization process of this occupation in the Netherlands is required to better understand changes in dental hygienists' scope of practice and current task redistribution processes.

As a term, *professionalization* has many definitions. Mok (1973) distinguishes ten different meanings of the term professionalization. The most frequently used meaning is *becoming a profession*. The terms *profession* and *professional* have been used since Ancient Rome and now have many definitions. The word *profession* originates from the Latin *profession*, which means *public declaration*. Through the centuries, professions have been characterized to have public and religious characteristics. In the nineteenth century, with the up and coming social infrastructure, professionals were recognized as experts. Freidson (1970) sees professions as forms of occupation, which are distinguished by their expertise, autonomy, power and status. In this study, we used Abbott's definition of profession: *exclusive occupational groups applying somewhat abstract knowledge to particular cases* (Abbott, 1988, p. 318). Abbott refers to the professionalization

process as the multilevel, contagious, complex social process that does not occur in one particular order because professions move in many directions (Abbott, 1991).

Although much has been written about dental hygienists' professionalization in other countries (Lautar, 1995 a; Gillis & Praker, 1996; Lautar & Kirby, 1996; Luciak-Donsberger, 2002; Adams, 2003; Adams 2004b), the professionalization of Dutch dental hygienists has not been studied extensively. In the following sections, we describe the professionalization process of Dutch dental hygienists based on Nelson and Barley's (1997) five steps of development and professionalization of new professions. Nelson and Barley argued that professions develop and gain their institutional recognition by taking actions in (1) developing a training system, (2) founding an occupational association, (3) linking practice to formal knowledge, (4) securing legal authorities to license and credential practitioners' professions and (5) acquiring the right to self-discipline. To determine the extent to which dental hygiene can be considered as a profession, we described the extent to which dental hygiene fulfills these five steps of professionalization.

1. Developing a training system

In the Netherlands, the first discussions of the introduction of the *oral care professional* began in 1920. This professional would only provide caries prevention in children, but even with this very strict definition of their scope of practice, the idea to introduce new professionals in oral care was met with much resistance from Dutch dentists. In 1931, the first school for *oral care professionals* opened, but the school was forced to close after just one year due to strong resistance from dentists; however, discussions about educating new professionals in oral healthcare continued. Between 1947 and 1955, three government committees investigated the possibilities of introducing the *oral care professional* and made recommendations for the implementation of this occupation. In all cases, the Dutch Dental Association rejected the proposals (Ten Bruggencate-Mulder, 2000).

With the increasing lack of dentists in the 1960s, the political pressure to educate *help professionals* in dentistry increased. The government even argued for oral care professionals with curative tasks, but dental associations feared a growing number of unauthorized oral healthcare professionals (NMT, 1989; de Maar, 1993). In 1964, however, NMT proposed to educate dental hygienists to perform general dental services instead of only caring for children, as was previously proposed (NMT, 1989). Because of the lack of facilities to educate dental hygienists in the Netherlands, in the period between 1965 and 1969, women were sent to the United States, Canada or England to be educated in dental hygiene (Ten Bruggencate-Mulder, 2000).

In 1968, the first school for dental hygiene was established in the faculty of dentistry in Utrecht. The dental hygienist was defined by the NMT as a *female help professional with restricted curative authorization*. This two-year curriculum covered the following subjects: prevention, periodontology, basic caries diagnosis,

sealant, correction tasks and x-rays. In 1992, the curriculum was expanded to a three-year program by including more extensive practical training and adding anesthesia delivery training. In general, the scope of practice was not extended, but the extra year of education was needed because of the expansion of the types of practices in which dental hygienists worked (e.g., orthodontics, elderly care and hospitals), developments in oral healthcare (e.g., implants and new hygiene protocols), and changes in society (i.e., more elderly patients and more migrants). Due to high demands in oral healthcare and the introduction of task redistribution between dentists and dental hygienists, a four-year bachelor program offering competencies in both the diagnosis and treatment of caries and in applied research was initiated in September 2002. Since 2002, dental hygienists Bachelor of health are supposed to be able to screen not only the teeth and gums but also the patient's overall health and oral health (van den Heuvel et al., 2006).

2. Founding an occupational association

The Dutch Association of Dental Hygienists (Nederlandse Vereniging van Mondhygienisten – NVM) was established in 1967 and gained its royal recognition in 1970. The first NVM journal appeared in 1977.

The NVM represents dental hygienists, controls the scope of practice and dedicates itself to better harmony between both supply and demand in oral healthcare and between education and the work field. In 1989 a *professional code* for dental hygienists was approved.

Currently, the NVM with approximately 2200 members is a large organization that aims to enhance the position of Dutch dental hygienists. The NVM represents dental hygienists in issues with politics, government, insurance companies, patient organizations and other professional groups. The NVM also aims to stimulate quality care, knowledge development and contact between dental hygienists (www.mondhygienisnten.nl, 2011).

3. Linking practice to formal knowledge

Dental hygienists' research activities are not that developed in the Netherlands, which is comparable to the situations in Canada and the USA (Cobban, Edgington & Compton, 2007). Most research in the field of dental hygiene is performed by dentists at universities. Since the establishment of the new four-year bachelor program for dental hygienists, more attention has been paid to evidence-based practice and research skills and knowledge during the education, which is considered an essential step in the professionalization of dental hygiene (Cobban, 2004). The NVM installed a special member of their board on the education and science portfolio in 2008. Shortly after, the section *research* was installed, which has approximately 15 active members. The goal of this group is to share knowledge, stimulate contact between dental hygienists involved in scientific research and increase the interest of other dental hygienists in research activities. Dutch dental

hygienists primarily publish their research in the International Journal of Dental Hygiene and the Dutch Journal of Dentistry (Nederlands Tijdschrift voor Tandheelkunde - NTvT). The NVM's Dutch Journal of Dental Hygiene (Nederlands Tijdschrift voor Mondhygiene - NTvM journal) occasionally contains research publications, but this is generally not a peer-reviewed journal.

4. Securing legal authorities to license and credential practitioner professions

The dental hygienist was legally recognized as an oral healthcare provider in 1974 by the introduction of the *Dental Hygienists' Resolution*. This document describes (1) dental hygienists' scope of practice and the conditions to gain authority, (2) exam regulations, (3) the tasks of health inspection, and (4) the establishment of the permanent advice institution.

Although dental hygienists have been able to establish their own dental hygiene practice since 1978, this was not legally regulated, and the existence of these practices was based on an interpretation of the law. The NMT argued that the cooperation between dentists and dental hygienists would not be possible with dental hygienists in their own dental hygiene practices. In 1988, the NMT took the following position:

1 The relationship between the dentist and dental hygienist does not have to be of the employer-employee type;

2 Although it may be legal for dental hygienists to start their own practice, the NMT prefers that dental hygienists work in a dentist's practice;

3 Patient treatment is based on the direction and control of the dentists; dental hygienists are not allowed to treat patients without a dentist's direction and control. In addition, patients always need a dentist's referral to visit a dental hygienist.

In 1992, the Ministry initiated the development of *the profile of the dental hygiene profession*. The aim was to better link education and developments in the work field, and a clear profile of the profession would improve this process.

The cooperation between dentists and dental hygienists was initially regulated as *dental hygienists working under instruction and control of dentists,* but this was changed to *dental hygienists working with dentists' referrals* in 1994. This last regulation created possibilities for the dental hygienist profession to gain a more independent status, and dental hygiene practices were also regulated by law at that time; however, patients always needed a dentist's referral to visit a dental hygienist.

In 1997, the BIG law (Wet op de Beroepen in de Individuele Gezondheidszorg) was introduced. Since the BIG law, the distinction has been made between so-called *heavy treatment* and *light treatment* for professions in healthcare. The dental profession is regulated by heavy treatment with the BIG register and disciplinary rules and regulations regarding *reserved treatments*. Only dentists are allowed to

perform these treatments independently, and they are allowed to delegate them to other professionals. The profession of dental hygienists is regulated within the light treatment with no BIG register and no disciplinary rules except the protection of the professional title and the possibility to perform reserved treatments. These treatments, however, can only be performed under three conditions: (1) dentists have to provide an assignment for the task, (2) dentists have to provide directions and control, and (3) the dental hygienist must consider himself/herself capable in this task.

In 1997 Professor Schaub stated that the position of *help professional* was no longer applicable from the societal and professional point of view; dental hygienists are professionals with their own professional status in patient care (Berkel, 1997). At the NVM conference a year later, the Ministry of VWS stated that dental hygienists gained a full position in oral healthcare as professionals. This was established by the BIG legislation, which helped creating a greater interest for dental hygienist schools, education in a team concept in the dentist and dental hygienist school in Groningen, an increasing number of dentists who employ dental hygienists and/or refer patients to dental hygienists and the patients getting familiar with the dental hygiene profession. The Ministry further endorsed the need to consolidate the position of dental hygienists.

The last changes in dental hygiene legislation were made in 2006 (VWS, 2006). Since 2006, dental hygienists have gained their *functional independency* ánd *free accessibility*. Functional independency refers to performance of reserved treatments with a dentist's assignment, but not under the dentist's direction and control. Free accessibility implies that patients do not need a dentist's referral to visit a dental hygienist. Thus, the current situation is that patients may visit dental hygienists without a dentist's referral, dental hygienists may perform all tasks within their scope of practice without a dentist's assignment, they may perform two reserved treatments (anesthesia delivery and preparation and restoration of caries) with a dentist's assignment (but without a dentist's direction and control), and they may perform other reserved treatments with a dentist's assignment, direction and control, but only when they can show their competency for it according to BIG Low.

5. Acquiring the right to self-discipline

Self-discipline is described as a stage in which *key controls are internalized and proactive rather than external and reactive* (Evetts, 2006 p. 525). Based on this definition, we can state that dental hygiene in the Netherlands has some right to self-discipline on the national level. Although dental hygiene has existed since 1968, it has always been closely related to the dental profession. The first dental hygienists were even educated within dental schools.

The development of the quality policy in dental hygiene was subsidized by the government between 1994 and 2003, and the NVM and other allied healthcare professions have acted on their own since 2003. Since 1997, dental hygienists have

been able to register as allied healthcare professionals; however, the NVM introduced their own quality register in 2009.

The BIG law does not register graduated dental hygienists. Diploma register for all dental hygienists in the Netherlands was established by the NVM in 2010, which was designed to decrease the number of unauthorized persons performing dental hygienist work. The professional title of dental hygienist is protected by the BIG law, and the NVM encourages their members to report all unauthorized use of the dental hygienist title to the Health Inspector.

Together with other allied healthcare professions, dental hygienists established the National Grievance Committee in which all dental hygienists from dental hygiene practices participate. Professional ethics are described in the dental hygiene professional code, which is used in the visitation program and other inter-colleague assessments of the NVM. The NVM does not have internal disciplinary rules.

We can conclude that dental hygiene can in most but not yet in all aspects be considered as a profession. This is based on the well-described training system, the functioning occupational association and the clear legislation. More development is possible considering the linking practice to formal knowledge and acquiring the right to self-discipline. From now on, in our research, we consider dentistry and dental hygiene as professions and other oral healthcare positions in general practices as occupations, specialist care excluded.

1.2.3 Task distribution in Dutch oral healthcare

In this section, we describe the process of task delegation and task distribution in Dutch oral healthcare from its very beginning in the 1970s to the latest developments. At the end, due to lack of evidence on the effects of task distribution in the Netherlands, we describe studies on the effects of task distribution, considering the quality of care provided by dental hygienists and dentists in other countries; however, we first introduce and define the concepts and terms that are related to task distribution.

1.2.3.1 Task distribution and related terms

To clearly define task distribution, several related terms must be introduced. Many of these terms are defined by the Council for Public Health and Healthcare (RVZ, 2002). First, a *task* is an activity formulated by specific rules, which is logical, significant and a necessary part of performing a job directed to a specific goal. A set of tasks that should be performed by a single person is defined by the term *job (position)*. New jobs are created by dividing tasks in jobs, which is defined as j*ob differentiation*. *Task distribution* is simple division of tasks over occupations. Shifting of tasks is called s*ubstitution*, and we can distinguish vertical and horizontal substitution. In vertical substitution, tasks are shifted to a lower educated occupational group, and in horizontal substitution, shifting is between

members of occupational groups of equal education levels (RVZ, 2002). Vertical task substitution is also called task delegation.

In dentistry, task delegation is interpreted differently than in organizational science. In organizational science, task delegation is considered as the process of granting decision-making authority to lower-level employees (i.e., it is the highest level of empowerment) (Beulens, Van den Broek, Van der Heyden, Kreitner & Kinicki, 2006). In dentistry, however, task delegation is interpreted as delegation of a particular, often manual, task from the highly educated professional to a lower educated professional (Weisz, 1972; Schaub, 2008). The main difference between these two interpretations in practice is that the task delegation in dentistry often does not include the transfer of decision-making authority.

Currently, there is a shifting of professional domains with corresponding tasks, responsibilities and jurisdiction from highly educated professionals to lower educated professionals, which is called *task redistribution*. The term task redistribution refers to changes or adjustments in the current task distribution, and the Council for Public Health and Healthcare (RVZ, 2002) defines task redistribution as *a structural redistribution of tasks between different professions*. In task redistribution, the tasks are not divided over different jobs but over different occupations in a society because legislation and education are normally linked to occupations and not jobs (positions). To combine all important facets of task redistribution into one definition, we reformulated the RVZ definition: *Task redistribution is the structural reallocation of tasks with the corresponding responsibilities and authorities between different professions or occupations in a society*.

With the introduction of task redistribution in dentistry, task delegation obtained some negative meaning, in the sense that task delegation does not include transfer of authority and responsibility. From the organizational perspective, however, we still consider task delegation as the highest level of empowerment. In fact, we are dealing with three levels of analysis here (Table 1). Task (re)distribution involves the distribution of tasks over professions and is used on the societal level to indicate and describe the distribution of roles and tasks over different occupations, whereas task division and delegation refers to the allocation of tasks over jobs on the organizational level. Job content and scope of practice are mostly used to describe the range of activities on individual level, as a result of task (re)distribution and task division/delegation. Sometimes, job content and scope of practice are also used on societal level indicating a whole range of activities of dental hygienists.

Table 1. Task distribution-related concepts per level of analysis

Level of analysis	Involved entities	Concepts used
Societal	Occupations/professions	Task (re)distribution
Organizational	Professional practices	Task division Task delegation
Individual	Professionals	Job content Scope of practice

1.2.3.2 Task distribution from the beginning

The first experiments on task distribution from dentists to dental hygienists occurred in the 1970s as a result of the scarcity of dentists. Task distribution has also received some attention within the government. In 1977, following the government's advice on the future of dental services, recommendations were made for additional oral healthcare for children in which few dentist's tasks could be shifted to dental hygienists (Schaub, 2008).

Several experiments on task distribution between dentistry and dental hygiene were performed: e.g., the dental healthcare project in Jordaan, the School for *Child Oral Healthcare Professionals*, and task delegation in a group dental practice in Abcoude (Tan, 1980). All of the experiments investigated task delegation within a team, but they did not delegate the same tasks (reversible or irreversible treatments) and/or same patient groups (children or adults) to dental hygienists.

In 1985, a report from the Committee for Educational Advise for Dentists (Adviescommissie Opleiding Tandarts - AOT) pleaded for adequate teamwork education for dentists, which would reduce the number of required dentists (1985). At the organizational level the optimal cooperation between dentists and dental hygienists was hard to realize because dentists were not educated to work together with dental hygienists. Indeed, neither the patients nor the dentists were familiar with the dental hygienists' activities. In addition, at the societal level there was no urgency to support this proposed team concept because there was a surplus of dentists in the eighties; however, the AOT report received more attention ten years later (Ten Bruggencate-Mulder, 2000).

In the 1990s, it became clear that the Netherlands would have to deal with a great scarcity of dentists in the future. The Steering Committee on Future Healthcare Scenarios (STG) predicted that by 2010, approximately one million people would not be able to receive oral healthcare (STG, 1992). In 1997, the *Market Competition and the Pricing Process in Healthcare* report reopened discussions about task distribution in dental healthcare. This report proposed to extend the dental hygienist's scope of practice by adding more screening tasks. Therefore, changes in education and regulations regarding dental hygienists working under dentists' directions would be needed. The NVM and the NMT differed in their view and

position regarding this report. The NVM referred to dental hygienists as *gatekeepers* in oral healthcare, whereas the NMT did not consider them capable of performing this role (Ten Bruggencate-Mulder, 2000). The discussion continued until the next Dutch oral healthcare report of the Lapré Committee in 2000.

1.2.3.3 The introduction of task redistribution in the twenty-first century

The Lapré Committee was formed to investigate the nature, gravity and magnitude of the capacity shortage in oral healthcare and make recommendations to address the shortage (The Committee for Capacity in Oral Healthcare, 2000). The committee advised the Minister to increase the capacity of dental and dental hygiene schools and to stimulate teamwork concepts to solve the capacity problem. The idea of the team concept was based on cooperation and task delegation (Figure 1). The *Task Redistribution in Healthcare* report (RVZ, 2002), however, argues that cooperation and delegation alone are not enough to solve the capacity problem; a structural redistribution of tasks is needed.

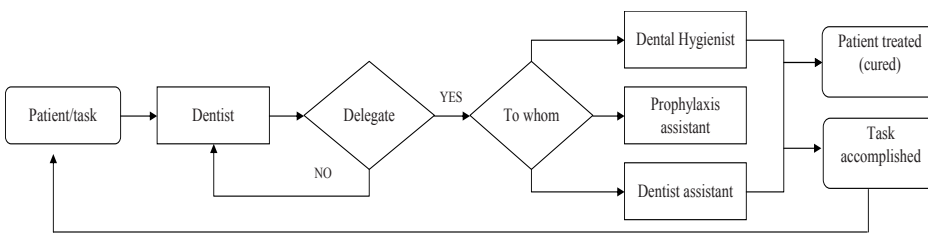


Figure 1. The process of task delegation in a dental practice (analytical view), specialist care excluded

Following the recommendations of the Lapré Committee, the education for dental hygienists was extended to a four-year curriculum in 2002 with the addition of basic curative treatments for caries. The corresponding change in legislation regarding the *functional independency* and *free accessibility* of dental hygienists was realized in 2006 (VWS, 2006).

The Innovation in Oral Healthcare Committee (2006) also underlined various possibilities for dental hygienists to take over routine tasks from dentists. In the committee's definition of task redistribution, dental hygienists were not considered to work under dentists' supervision anymore. In addition, the introduction of a new, six-year dentists' curriculum in 2006 raised expectations for the enormous increase of instances of task redistribution in the future, which would only be possible if all professionals worked in teams. The Innovation in Oral Healthcare Committee presented the following 'ideal' view of task redistribution:

> *Task redistribution in oral healthcare means that, in 2016, primary, secondary and tertiary prevention of caries and periodontitis in a large*

group of medically uncompromised patients with stable oral health will be performed by a four-year-educated dental hygienist assisted by a prophylaxis assistant (2006).

The committee's expectation was that task redistribution would have a positive effect on the capacity problems and oral healthcare quality for several reasons:

- Dentists could concentrate on complex tasks that better fit their academic education;
- The teams could work more efficiently in accordance with protocols and standardization;
- Teams could better deal with high care demands in terms of spikes in the number of patients because of the possibility of horizontal and vertical referral, task delegation and substitution;
- The possibilities for collegial support and transfer of knowledge in teams could improve;
- Lower sickness absence could be achieved due to expected higher job satisfaction.

The first new dentists with a complex scope of practice will graduate in 2012, whereas the four-year-educated dental hygienists already entered the labor market in 2006. Task redistribution has not been structurally implemented in all dental practices, and due to changes in dental hygienists' education, two-, three- and four-year-educated dental hygienists are delivering oral healthcare in the Netherlands. Therefore, it is difficult to predict how much task redistribution has already occurred and how task redistribution will develop in the future. A topical debate and government-subsidized studies have been initiated to gain insight into the current task redistribution and establish the required capacity in the future (Capaciteitsorgaan, 2010).

1.2.3.4 Effects of task redistribution on oral healthcare

Due to the lack of adequate outcome parameters, it is difficult to measure the effects of task redistribution on oral healthcare (RVZ, 2002). In this section, international studies on dental hygienists' participation in diagnosis and treatment of caries are presented to indicate the dental hygienists' quality of work regarding these additional tasks.

Task redistribution amongst dental professionals is a worldwide process, but the task redistribution in Dutch oral healthcare can be seen as a forerunner (Jonhson, 2003; Jonhson, 2009; Commissie Innovatie Mondzorg, 2006) (Box 1).

Box 1. Dental hygienists' scope of practice

> Due to educational and regulatory differences, there are also differences in the scope of practice among dental hygienists from different countries. Regarding tasks in the prevention and treatment of periodontal diseases, dental hygienists' scopes of practice are quite similar. The most salient difference is that of the treatment of caries. Dutch dental hygienists are allowed to diagnose and treat caries by making preparations and restorations. In other countries, dental hygienists may treat caries, but they are not allowed to make preparations by 'drilling' (they place and finish restorations). Dental hygienists in Canada, the United States and the United Kingdom participate in the detection and treatment of caries on a regular basis. (Commissie Innovatie Mondzorg, 2006)

The resistance to task redistribution is often based on opinions about a presumed low quality of work performed by lower-educated professionals. Many studies, however, have eliminated the doubts about the quality of dental hygienists' work in diagnosis and treatment of caries and the cost-effectiveness of task redistribution. Two studies reported a high agreement in caries detection between dental hygienists and dentists (Mauriello, Bader, Disney & Graves, 1990; Petersson & Bratthall, 2000). Indeed, Mauriello et al. (1990) and Petersson and Bratthall (2000) concluded that dental hygienists are competent in the assessment of caries, and Ohrn, Crossner, Borgesson, and Taube, (1996) found similar results. In the Ohrn et al. study, there was no significant difference in the diagnosis of caries between dentists and dental hygienists. Moreover, the dental hygienists' more preventive and non-restorative approach appeared to be more beneficial for the patients compared with the dentists' restorative solutions. Interestingly, the interpretation of x-rays to determine the presence of caries was similar between last-year dentistry and dental hygiene students (Wojtowizc, Brooks, Hasson, Kerschaum & Eklund, 2003). In addition, a literature review by Baltutis and Morgan (1998) reported nine different studies showing positive results regarding task redistribution and task delegation to dental hygienists in terms of higher productivity, lower costs, quality maintenance and high patient acceptance to be treated by dental hygienists. In Australia, dental hygienists are almost always used for preventive child oral healthcare, which results in cost reductions and a decline of caries prevalence among children (Riordan, 1997), and the most commonly practiced clinical activity among Norwegian dental hygienists is dental check-ups (Tseveenjav, Virtanen, Wang, & Widström, 2009). Comparable results were found in the economic analysis of Hannerz and Westerberg (1996) in Sweden, who also argued that a team with one dentist and five dental hygienists is more cost-effective and achieves a higher reduction of caries compared with a team of two dentists and four dental assistants.

In conclusion, studies have demonstrated positive results of dental hygienists' competence to detect and diagnose caries. Task redistribution and task delegation to dental hygienists have also been reported to result in a greater reduction of caries prevalence, lower costs, higher productivity and quality maintenance.

There are very few studies on the effects of task redistribution on patients' satisfaction and perception about Dutch oral healthcare. The most recent results (Hansen, van der Maat & Batenburg, 2010) showed that patients are informed about the different level of education of different dental workers; however, very few patients were familiar with the difference in the scope of practice and authority between dental hygienists and prophylaxis assistants. Although patients who have experience with dental hygienists are more likely to choose to be treated by a dental hygienist instead of a dentist, most patients choose a dentist in cases where they need a dental checkup or a restoration.

1.3 Theoretical framework

Having clarified the themes from a practitioner's perspective in the previous sections, this section introduces the theoretical framework that can help us explain the process of task redistribution in dental healthcare and its consequences. The conceptual approach of Abbott (1988) focuses on the interrelation between professions, gaining professional status and cultural mandates, and the Job Characteristics Model of Hackman and Oldham (1980) focuses on the individual level in explaining the relationship between practitioner' work, job complexity and job satisfaction.

1.3.1 Abbott's conceptual approach

Based on previous studies of the interprofessional relationship between dentists and dental hygienists, we expected that dental hygienists' professional ambitions and dentists' drive to maintain authority in oral healthcare would be important factors in the process of task redistribution. To study the factors and processes that influence task redistribution on the level of professions, we utilized Abbott's work (1988).

Abbott sees professions as developing and operating in relation to one another rather than independently: *Professions are never seen alone…They exist in a system* (Abbott, 1988, p. 4). Abbott's definition of *professions* is *exclusive occupational groups applying somewhat abstract knowledge to particular cases* (Abbott, 1988, p. 318). In this definition, he argues that professions are a special kind of occupation.

Abbott (1988) argues that professionals fight over jurisdiction in professional domains. The capacity to redefine certain occupations' domains and make them their own could be translated as the extent to which an occupation succeeds in

professionalization. Moreover, a profession must show what exclusive expertise it offers (i.e., something other occupations do not do). As a member of a profession, however, an individual professional is never certain in this exclusivity; one always has to prove himself to other professionals.

The manner by which one professional establishes a relationship with other professions is related to his/her survival and success. Based on this idea of interdependency between professions and the fight over jurisdiction in professional domains, the conceptual approach of Abbott (1988) was chosen as a framework to provide insight into the context and relational factors that influence the process of task redistribution between dentists and dental hygienists. In the following pages, we describe the most important constructs in Abbott's theory.

There are four core constructs in Abbott's theory.

1 Objective and subjective job characteristics

According to Abbott (1988), *the tasks of professions are to provide expert service to amend human problems* (p. 33). Because those human problems have objective and subjective characteristics, the tasks of the professionals dealing with these problems also have objective and subjective characteristics. Objective characteristics of human problems are those with a natural or technical origin in which a problem still exists even after the problem has been redefined by another profession. As an example, Abbott refers to the problem of alcoholism. No matter which group of professionals appropriates this problem, the person involved still has a problem and needs professional help. Subjective characteristics have a more social or cultural origin. In some societies and/or cultures, some issues are seen as a problem, whereas in other societies and/or cultures, the same issues are considered an unknown phenomenon. Missing teeth is one example; not all societies/cultures consider this as a problem that must be solved.

2 The methodology professionals use in their job: diagnosis, interference and treatment

A professional translates the problem in the language of his own professional system and makes a diagnosis. Interference is the process of making choices in treatment, and, in this phase, the professional is the most vulnerable. This is especially true for professionals who have to choose among many options because that creates a greater likelihood of making a mistake.

3 The organization/structure of a profession and possible conflicts between professionals of different occupations

The extent to which a profession is well defined, organized and united is important for its chances to gain and maintain jurisdiction. Professions with broad focus, however, might have an advantage in competition with other professions because they can easily take on new tasks and reject old tasks. Therefore, these broad

oriented professions can assume a better position in competition compared to professions with a single clear focus. The strength of professions with one focus becomes their main weakness.

Possible conflicts can arise between professions regarding uncertainties about who has the (final) responsibility for a certain task. Even if a matter of responsibility is described in a job specification, there are often negotiations between professionals. In this model, the term *vacancies* is used as a kind of gray area between fields and tasks in which conflicts between two professions could arise.

To maintain the optimal abstract level of knowledge necessary for the jurisdiction over a certain domain, internal differentiation between professions is required. This is due to possible overlap in knowledge and jurisdiction that could lead to more conflicts between professions. Internal differentiation can be accomplished by two simple mechanisms: fusion (i.e., the integration of two professions) or separation (i.e., one part of the profession separating and forming a new profession).

Although examples of fusion and separation have mostly occurred in the past, more complex methods of internal differentiation currently exist:

Professional regression: professionals who gained high status and developed an advanced state of knowledge tend to concentrate on certain complex tasks and reject what they deem to be very *easy* tasks.

Client differentiation: due to high job complexity, more specialties arise.

Degradation: the work loses its professional status because subordinate occupations take over tasks. The status of the group that delegates tasks could decrease if important routine tasks are distributed over subordinate occupations. Conversely, the professional status of the subordinate group could increase because this task redistribution often leads to higher demands in the intake profile of the subordinate profession.

4 External and internal factors of the changes in professional domains of different occupations

Professions are constantly taking over tasks from each other, especially if more status and power can be earned. This is very important because the tasks, the professions and the links between them constantly change. Abbott (1988) argued that these changes, to some extent, arise beyond the world of professions and the competition between them. Social forces, politics and technology divide tasks and regroup them. In addition, they introduce new professions and kill old professions. Abbott distinguished between internal and external factors for the changes in professional domains. A profession's specific knowledge and technologies were considered internal factors, which have historically already led to the rise of new

professions. Changes in society, culture, clients, legislation and management views are examples of external factors.

Furthermore, Abbott (1988) argued that society must acknowledge the profession as the owner of a certain domain. This is possible through politics (legislation), public opinion (in which the media has an important role) and because of the practice and the work field. Although dental hygiene in the Netherlands is not a new profession, dental hygienists with a Bachelor of health degree must gain a new position within a dental team and Dutch dental healthcare. Even if the expansion of the dental hygienists' scope of practice is lawful, Abbot's approach would suggest that the new dental hygienist's position is also dependent on other professions with whom dental hygienists share work-related mutual dependence. This work-related dependence is more influential if the task fields between these professionals overlap, which is certainly the case for dentists and dental hygienists. An example is caries diagnosis and treatment, which is included in the scope of practices of Dutch dentists and dental hygienists.

In the Netherlands, much discussion has taken place about the so-called *gray area* in tasks between dentists and dental hygienists, and the issue of the final responsibility regarding these tasks from the gray area is sometimes still a point of discussion. Dental hygienists' scopes of practice have been proven to be an important factor for interprofessional conflict between dentists and dental hygienists in Canada (Adams, 2004b). Interestingly, the extent of the dental hygienists' scope of practice seems dependent on dentists' willingness to distribute tasks to dental hygienists (Uitenbroek et al., 1989; Bruers et al., 2003). We built on the work of Abbott (1988) to analyze which processes and factors are influential in shifting tasks between two groups of professionals, given that one group has historically been dominant. In this research, we concentrated on the less dominant group. Because Abbott himself mentions this gap in his theory, which insinuates that a professional group acts as a whole, we aimed to complement his view on competition at the level of professions as a whole, with an analysis of the contribution of organizational and interpersonal factors that may be of importance to how scopes of practice develop.

Abbott's (1988) approach also contains some concept of job complexity, which can be defined by three methodologies a professional uses in his/her work: diagnosis, interference and treatment. As the complexity of these activities increases, the professional status of a profession increases. Therefore, job complexity can be interpreted as a positive development for a profession as a whole. Job complexity is also encompassed by Hackman and Oldham's (1980) JCM, which recognizes job complexity as a positive factor for work outcomes on an individual level. Interestingly, Abbott's approach to professions as a whole has some similarities to the JCM, which is focused on the individual level.

1.3.2 Hackman and Oldham's Job Characteristics Model

The previous section presented the theoretical framework regarding the relationship between professions. The research question in the present study, however, also covers the relationship between dentists and dental hygienists as individual professionals. We argue that institutional, organizational and interpersonal factors may be important in the development of job content and how these developments affect a professional's individual development. Therefore, the effect of changes in job content on job complexity and the job satisfaction of dental hygienists on the individual level were investigated in terms of Hackman and Oldham's JCM (1980). We argue that in both theories, (i.e., Abbott's theory (1988) and the JCM (1980)), job complexity is presented as a positive factor that influences different outcomes (only on a different level). In Abbott's approach, the focus is on the professions as a whole, and the positive outcome is a higher professional status. In the JCM, individual professionals are the basis of the theoretical framework with their work and personal outcomes.

The early work of Turner and Lawrence (1965) influenced the development of the JCM by Hackman and Oldham in 1980. Turner and Lawrence argued that a more complex set of tasks is associated with increased job performance, motivation and job satisfaction. Five core job characteristics (i.e., skill variety, task identity, task significance, autonomy and feedback from job) determine this complexity and may indirectly affect work outcomes (Figure 2). Of those five job characteristics, autonomy and job feedback are considered the most important for personal motivation (Dodd & Ganster, 1996).

According to the JCM, workers reach positive personal and work outcomes through three critical psychological states (i.e., experience meaningfulness of the work, experience responsibility for outcomes of the work and knowledge of the actual results of work activities). These three psychological states mediate the relationships between the five job characteristics and personal and work outcomes.

Aside from the three psychological states as mediators, personal factors, such as growth need strength (GNS), knowledge of results and working environment characteristics (extrinsic job satisfaction, security and interpersonal contacts), also moderate the relationship between the independent and dependent variables in the JCM (Arnold, 2005; Warr, 2007; Bok, 2008). Growth need strength operates as a moderator twice: between the job characteristics and the psychological states and between psychological states and job outcomes. Interestingly, serious doubts have been raised about the role of GNS as a moderator of the relationship between job characteristics and psychological states and the relationship between psychological states and outcomes because the nature and manifestation of GNS, the measurement thereof, and the mechanism of need satisfaction are still polemical (Boonzaier et al., 2001).

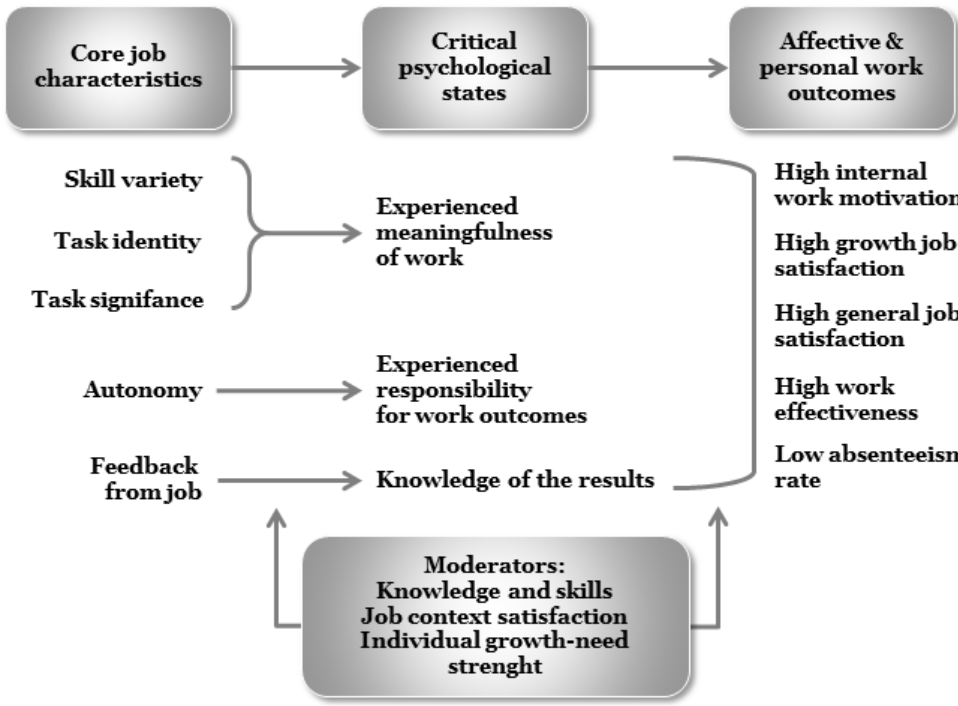


Figure 2. The Job Characteristics Model (Hackman & Oldham, 1980).

The job diagnostic survey (JDS), which was developed to measure five job characteristics, three critical psychological states, work outcomes and two moderators (i.e., knowledge/skills and GNS), is suitable for several purposes:

- to diagnose jobs with demand for change to increase motivation and satisfaction;
- to identify the most important job characteristics to improve one's job
- to test the workers' reaction on the improved jobs.

The JCM offers also a single index of motivating potential score as the overall potential of a job to influence work outcomes. Based on the latest review of the JCM, a simple additive index of five core job characteristics is recommended for use in job redesign interventions (Boonzaier et al., 2001).

The characteristics of the job, the worker and the work environment are put forward as three dominant sets of variables that constitute the world of work (Steers & Porter, 1991). Aside from job characteristics, Boonzaier et al. (2001) suggested that the identification, definition and measurement of appropriate worker and work environment characteristics should be the focus of future research on the JCM. They argued that worker and work environment characteristics account for significant amounts of variance in motivation and satisfaction (beyond the influence of job characteristics), which enhances the

predictive validity and practical usefulness of the JCM. Thus, we included four relevant work environment characteristics and two worker characteristics in our study. Role conflict, role ambiguity, supervisory support and interpersonal contacts were measured as work environment characteristics to assess their relevance in work structuring and job satisfaction. Other work environment characteristics mentioned in the JCM, such as security, were not measured because they seemed to have less influence for our target group, and less variance was expected. With regard to the worker's characteristics, we measured dental hygienists' GNS and we used indirect data on self-efficacy. From a professionalization perspective (e.g., Henriksson, Wrede & Bureau, 2006), GNS measurements were relevant, i.e., to investigate GNS within this group of professionals and the extent to which GNS moderates the relationship with job satisfaction. Our group of professionals mainly consisted of young people with different preliminary educations and careers. For example, one group was already working in dental practices and had been educated later in their careers. Dental hygienists' self-efficacy could affect task redistribution in two ways. First, dental hygienists' self-efficacy could affect dentists' confidence in dental hygienists' work, which would influence task redistribution. Secondly, the extent of a dental hygienists' self-efficacy could be an indicator of the extent of dental hygienists wanting to perform complex tasks. In both ways, dental hygienists' self-efficacy may also affect their perceived job characteristics and job satisfaction.

Hackman and Oldham's (1980) model is a model that describes the relationship between a person's perceived job characteristics and job satisfaction. The relationship between the tasks themselves (scope of practice) and the perceived job characteristics has received less attention in the literature. Currently, the extent to which the cognitive structure of the five job characteristics is independent of the job itself is unclear. To the best of our knowledge, the JCM has mostly been tested in cross-sectional designs (Fried & Ferris, 1987; Bonzaier et al., 2001). Due to our longitudinal approach, we could investigate the changes in perceived job characteristics, job satisfaction and corresponding changes in job content. This is based on the comparison between the groups with different levels of education and scopes of practice within the same profession.

Furthermore, in this study, we searched for the link between the job complexity, from the perspective of Abbott's (1988) approach, and the job complexity concept, which has been proposed by Hackman and Oldham (1980) (see Section 1.3.1).

1.4 Objective of the study and research questions

The focus of the present study moves from the conditions of the introduction and the implementation of task redistribution to the internal consistency of JCM theory and sustainability of job satisfaction over time. Our research questions addressed both theory and reality, from the practical problems and existing theories.

First, we aimed to explain the factors and processes influencing task redistribution between dentists and dental hygienists and the conditions under which long-term task enrichment could be realized by dental hygienists. According to Abbott (1988), we should take into account the mutual interdependency and fights for jurisdiction between these professions, which could significantly affect task division within a practice and influence the satisfaction of all parties (professionals and patients) involved. Because Abbott appears uncertain as to where the state (as an actor) stands in relation to the *system of profession* (Dingwall & King, 1995) among factors/processes on the organizational and individual levels, the factors/processes on the societal level were also investigated. Changes in dental hygienists' education and legislation are examples of state interventions at the societal level. We also investigated organizational aspects, such as the capacity of different professionals in a practice and care demands, which may also influence task division in a practice. Furthermore, the literature suggests that more individual factors of professionals (mainly dentists' attitudes toward dental hygienists and treatment philosophy) are determinant for task distribution. These aspects were investigated to answer the first research question in this study:

RQ1: Which societal, organizational and individual factors contribute to the extent to which one profession (dentists) distributes tasks to another (dental hygienists), and how does the resulting task division influence workers' job satisfaction and patient satisfaction?

To explain our findings in terms of the JCM theory and to contribute further developments to this model, we needed to examine the internal coherence of the JCM and factors affecting the dimensionality of the JCM in a dental hygienist population. Many studies have reported different results on the dimensionality of the JCM among different populations. We wished to contribute to the knowledge about conditions that influence the dimensionality of perceived job complexity and assess the applicability for our study. Thus, our goal was not to test whether the five-factor solution proposed by Hackman and Oldham is universally valid but rather to gain more knowledge on the factors that influence the dimensionality of job complexity characteristics. In other words, does the dimensionality change when conditions change, and if so, how? The following research question corresponds to this objective:

RQ2: To what extent is the structure of perceived job characteristics stable under the condition of job content changes?

After examining the internal coherence of the JCM, we can investigate the perceived job characteristics, job satisfaction and relationship between changes in the scope of practice and the perceived job characteristics and job satisfaction in the dental hygienist population. Unlike many authors, we did not stress the relationship between perceived job characteristics and dependent variables in the JCM. Instead, we concentrated on the relationship between (changes in) job

content and perceived job characteristics. The aim of this study was to investigate whether the same professionals with different job contents perceive job characteristics differently. The perceived job characteristics in professionals with different job contents were compared, and a comparison was made within one subsample over time. Considering the possible significance of interprofessional relations between dentists and dental hygienists we also tested the effect of two work environment variables: role conflict and role ambiguity in the relation between job content, job complexity and job satisfaction. The following research question corresponds with this objective:

RQ3: What is the relationship between job content, perceived job complexity and job satisfaction in professionals with different scope of practice and what is the effect of role conflict, role ambiguity and GNS on this relationship?

The focus of the three research questions is presented in Figure 3.

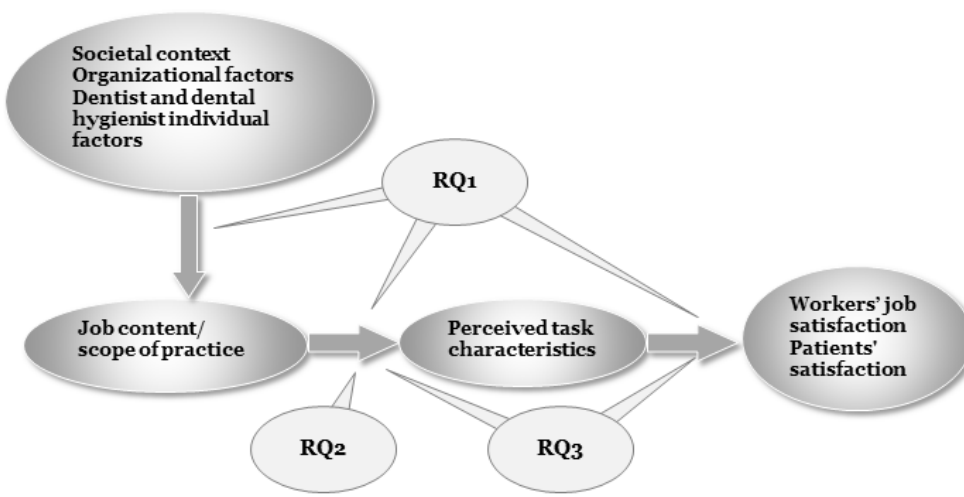


Figure 3. Focus of the three research questions

1.5 Thesis organization

This thesis includes six chapters. In this first chapter, the setting, theoretical frameworks and research questions were introduced. In addition, this chapter described Dutch oral healthcare in general, the development of the dental hygiene profession in the Netherlands and task distribution in oral healthcare. Two theoretical frameworks were introduced: the contextual approach of Abbott (1988) and the JCM (Hackman & Oldham, 1980) and the research questions were presented at the end of the first chapter.

In the second chapter, the research design and methods are described, including the design and the methodology of both the surveys of dental hygienists and case

studies in dental practices. Data analysis, which was used to answer the research questions, is described in separate chapters where individual research questions are discussed.

In the third chapter, we discussed the first research question regarding the important factors for task shifting between occupations. In addition, this chapter presents the results of the surveys and six case studies. We initially described the data analysis and case descriptions. In the cross-case analysis, three main groups of factors that could explain observed task distribution are discussed: societal context, organizational factors and individual factors of dentists and dental hygienists. The findings are then interpreted in light of the theoretical framework presented in the first chapter.

The study of the dimensionality/stability of five job characteristics among different groups of dental hygienists is discussed in Chapter 4, and the study of the relationship between changes in job content and perceived job characteristics and job satisfaction in different groups of dental hygienists is discussed in Chapter 5. The questions from a practitioner's perspective regarding the current task division and consequences of changes in job content on dental hygienists' job satisfaction are also covered in Chapter 5. The data of four surveys among different groups of dental hygienists are used in Chapters 4 and 5. In the sixth chapter, an overall discussion, the main conclusions and the contribution of this research to the theory on work structuring are presented. In addition, we discussed the practical implications of the research.

Chapter 2
The study's global design

In this study, two main data collection approaches were used:

1. Surveys among dental hygienists (total four surveys among two different subsamples) involving questionnaires concerning job content, perceived job characteristics and job satisfaction. In one subsample, longitudinal data were collected.

2. Case studies in six dental practices in the Netherlands, including interviews with dentists and dental hygienists, questionnaires among patients on their perception of received care and questionnaires among dentists and prophylaxis assistants on job satisfaction.

The case selection was based on the survey data; therefore, we initially describe the design, samples and measurements in surveys. Thereafter, we describe the case study design with the selection of the cases. The data analysis is described in specific chapters because the same data were sometimes used in different ways to answer different questions.

2.1 Survey study

Survey research among dental hygienists was chosen to provide insight into dental hygienists' job content, perceived job characteristics and job satisfaction. Existing scales were used for measuring job characteristics and job satisfaction, and the measurement of job content was performed by means of a questionnaire based on earlier research in this field. In total, four surveys were conducted. In this section, we describe the population, subsamples, procedures and measurement methods in the survey.

The survey data were collected from two populations of Dutch dental hygienists: those from the two- or three-year curriculum (i.e., *old style* dental hygienists) and those from the four-year curriculum (i.e., *new style* dental hygienists). The distinction between these two populations is of particular interest because of an expected difference in job content due to differences in educational programs and changes in legislation (see Section 1.2).

2.1.1 Population and subsamples

Table 2 provides information on the population and various subsamples.

Table 2: Overview of populations and subsamples in two different groups of dental hygienists

Subsample	Old style 1	Old style 2	New style 1	New style 2
Total population	1,662 members of the NVM*	1,724 Old style DHs** members of the NVM	104 DHs graduated by August 2006	425 DHs graduated by August 2008
Exclusion criteria	None	No E-mail address (n=515) E-mail error message (n=122)	Working abroad (n=0) No E-mail address (n=5)	Working abroad (n=4) No E-mail address (n=52)
N meeting inclusion criteria	1,662	1,087	99	369
Asked to participate	800 a-select	1,087	99	369
% response	40	38	67	55
N response	320	413	67	202
Measurement performed	April 2005	December 2009	July 2007	July 2009

*NVM – Dutch Association of Dental Hygienists

**DHs- dental hygienists

Old style dental hygienists

Two measurements were performed to assess developments in job content, perceived job characteristics and job satisfaction in the old style population.

The first measurement was obtained in April 2005 by means of a postal questionnaire. Of a set of 1,662 members of the Dutch Association of Dental Hygienists (NVM) who agreed to be contacted for our study, we randomly selected 800 of them to participate.

The second measurement was obtained in December 2009 by means of an e-mail linked to an online questionnaire. Among a set of 1,724 still active old style dental hygienists, members of the NVM, 1,209 were asked to participate in the study because e-mail addresses were only available for 1,209 dental hygienists. Those

from whom we received an E-mail error message were also excluded from this study. This resulted in 1,087 participants.

New style dental hygienists

We also performed two measurements in the new style dental hygienist group to assess developments in this population over time. Both measurements were obtained from the total population of new style dental hygienists by means of an e-mail linked to an online questionnaire. Dental hygienists working abroad were excluded from the study.

The first measurement was obtained in July 2007. Among a total population of 104 new style dental hygienists, 99 were asked to participate in the study because their e-mail addresses were available.

The second measurement was performed in July 2009. Of the 425 dental hygienists that had graduated by September 2008, E-mail addresses of 369 participants were available. Two weeks after the first E-mail reminder, we phoned the non-responders. A total of 149 calls were made because we only managed to collect this many telephone numbers. Four dental hygienists were not interested in the study (mainly due to lack of time), 123 were willing to participate, and 22 were not available.

A longitudinal measurement was performed in the new style group because the sample of 99 dental hygienists from the first measurement was also included in the sample of the second measurement. In total, 50 paired measurements were identified.

2.1.2 The questionnaire

Each participant completed a questionnaire consisting of four parts:

1. demographic and work setting data

2. job content

3. job characteristics

4. job satisfaction.

Demographic and work setting data

The following demographic characteristics were collected from all subsamples: gender, age, years of experience, number of weekly working hours, type of practice and number of colleagues. In the old style 2 and both new style subsamples, we also collected data on the number of treatment chairs in the practice, the year of graduation and the type of employment. Data on additional courses in caries treatment were only collected in the old style 2 group to investigate whether old-style dental hygienists were properly educated to perform extended tasks in the caries field. In case a dental hygienist was working in two or more practices, the

respondents were asked to fill out the questionnaire for their job in the practice with the highest working hours.

Job content

Job content was defined by whether respondents engaged in tasks in oral healthcare and, if so, how frequently. Each task was rated on a five-point scale (ranging from a score of one for *never* to a score of five for *always)* for each client, provided the client's condition required the task.

The first questionnaire for the old style 1 group consisted of the most common activities in dental hygienists' jobs (40 tasks were listed). The initial choice of listed tasks was based on an earlier study (Kerckhoffs, 2002) and on the Omnibus-enquête from the Dutch Dental Association (NMT, 2002). Next, two dental hygienists, two dentists and five dental students assessed the list, which resulted in the addition of another six tasks. Finally, the questionnaire was checked for clarity and terminology by eight researcher colleagues.

For the new style group, this 40-item list was extended to obtain insight into dental hygienists' full scope of practice (i.e., more items on both traditional tasks and tasks from the new curriculum were added). For some domains, tasks were extended (e.g., caries diagnosis and treatment), and new tasks were introduced (e.g., scientific research and health policy); the final list consisted of 73 tasks.

To compare job content between old- and new-style dental hygienists, the same questionnaire was used in both populations in 2009.

Job characteristics

Job characteristics from the JCM (Hackman and Oldham, 1980) were measured by 24 five-point Likert-type items that were drawn from a Dutch version of an existing questionnaire based on the JCM (i.e., the Basis Vragenlijst Amsterdam - BASAM questionnaire) (Biessen, 1992). We did not test the mediating role of three critical psychological states in the JCM because of inconsistent findings on mediating role of these critical psychological states between job characteristics and personal outcomes (Fried & Ferris, 1987; Boonzaier et al. 2001; Johns, Lin Xie & Fang, 1992). Therefore, we follow the suggestion of Algera (1981) to test direct relation between job characteristics and personal outcomes.

In the new style subsample, 12 items concerning GNS (Hackman & Oldham, 1980; Van de Ven & Ferry, 1980; Aldag & Brief, 1979; Tiegs, Tetrick & Fried, 1992) were also added to the questionnaire. We only measured GNS in the new style 1 subsample due to the longitudinal design in this part of the population.

Work environment

In the measurements among the old style 2 and both new style subsamples, four items on role conflict and seven items on role ambiguity used by Biessen (1992)

and based on Rizzo, House and Lirtzman (1970) were added. Role conflict and role ambiguity are considered as characteristics of the social system, not the person in the system. Role conflict is defined as the perception of incompatible or incongruent demands placed on role incumbent and role ambiguity is defined as a lack of clarity of role expectations and (Hardy & Conway, 1988).

Job satisfaction

The last part of the questionnaire consisted of seven items concerning intrinsic satisfaction, two items on extrinsic satisfaction and two items on satisfaction with career (Hellenthal, 2001). All of the items were scored on a five-point Likert scale.

During the study, the questionnaire was adapted to better fit the subsamples and the research question. Appendix I provides an overview of the questionnaire content of the new style 1 subsample, and Appendix II provides an overview of the items included in measurements in different sub samples.

2.2 Case study

Eisenhardt (1989) defined case study design as *a research strategy that focuses on understanding the dynamics present within a single setting (p. 534)*. The study of these dynamics is often of a qualitative nature. A limited number of cases/ organizations are investigated by means of observations or interviews to gain insight into particular processes. Based on the research's aim, Yin (2003) distinguished several types of case study research: exploratory case studies to define research questions and hypotheses; explanatory case studies to investigate causality; and descriptive case studies to illustrate events. The present case study is a combination of explanatory and descriptive case studies.

The motivation for choosing a case study design was related to the nature of our research question, the event and its context. Yin (2003) suggested that case studies are the most favorable method to investigate *how* and *why* questions. The present study was designed to explain how the organizational and (inter)personal factors/processes affect task division as well as what are the consequences for the involved workers and patients. The second important reason for choosing the case study method is the nature of the event investigated. Indeed, case studies are favorable when contemporary events are investigated and when behavior cannot be controlled (Yin, 2003), which is the case in task division in Dutch oral healthcare. The third reason pertains to the nature of the context. The study and its subject cannot be separated from its context. Indeed, case specific data must be taken into account to understand work organization and relationships.

In our case study, a combination of qualitative and quantitative data was collected. By combining both types of data, we drew a picture of the case that is as complete as possible with regard to relevant characteristics. In addition, different methods

were used to gather the data, which enables *data triangulation* and contributes to an enhanced internal validity of the study.

The external validity or the generalization of the findings in case studies is limited by the limited number of investigated cases. With regard to this issue, Yin (2003) explains the difference between *statistical* generalization, which is often based on survey research, and *analytical* generalization, which is used in case studies. The survey findings are often generalized to the world at large, and in case study research, a particular set of results is generalized to some broader theory. To enhance the external validity of this study, our case selection strategy was based on Yin's recommendations (2003).

Cases in our study are defined at the level of organizations (i.e., dental practices). We included organizational factors affecting task division, such as the magnitude of the practice in terms of number of treatment chairs, human resources and number of patients. Most dental practices are owned by dentist(s), and several other occupations are employed. The focus of the present study was to investigate organizational and dentists' personal factors affecting task division in a practice. Therefore, we only included the dentist-owner in our case study because this dentist decides on the policies for the organization and the division of work. Personal factors of new-style dental hygienists were investigated because new style dental hygienists are educated to perform all extended tasks and are more involved in task redistribution.

2.2.1 Case selection

The data from the first survey measurement among new-style dental hygienists in 2007 was used to select the cases. The selection of cases was based on two factors: sample variation in crucial categories and feasibility. To achieve sample variation in crucial categories, we first defined the categories. Feasibility was determined by the dental hygienists' and dentists' willingness to participate in the study.

Exclusion criteria

Before we selected potential cases, we first excluded two types of respondents: dental hygienists who did not worked the most hours in a general dental practice and dental hygienists working less than 12 h per week. The reason that we only included dental hygienists who filled out the questionnaire based on their jobs in general practices is because the main changes in new-style dental hygienists' job content occurred in the field of diagnosis and treatment of caries which is commonly treated in general dental practices. Moreover, the majority of Dutch dental hygienists work in general dental practices. The task division that occurs in other types of practices is not comparable with the task division in general dental practices because of different patient categories and the nature of jobs. The second exclusion criterion [i.e., dental hygienists' working ≤0.3 of a full-time equivalent (40 h per week)] was based on previous findings (Chapko, Milgrom, Bergner,

Conrad & Skalabrin, 1985; Bruers et al., 2003) demonstrating that the length of a dental hygienist's work week affects his/her job content. Therefore, we only included dental hygienists who worked more than 12 h per week. Among a total of 67 respondents from the first measurement, 24 respondents met these two criteria and were excluded.

Inclusion criteria

In the next step, we attempted to maximize the variance on the variables of interest. We examined the observed variance in practice size and job content. The practice size was determined by the number of workers in a practice in solo, middle and large practices. The dental hygienists' job content was divided into four categories according to cluster analysis findings: narrow, medium care, medium care and cure, and expended job content. None of the 43 respondents meeting the inclusion criteria had narrow job content. Interestingly, the only respondents who met the criteria for narrow job content (n=7) had a short work week, which was an exclusion criterion.

We also examined the observed variance in perceived autonomy, GNS and job satisfaction, which were used as selection criteria. Thus, all 43 respondents were categorized by their practice magnitude and job content, and we then searched for cases that clearly differed in their perceived autonomy, GNS and job satisfaction.

Based on these inclusion criteria, six respondents were selected: numbers 4, 13, 41, 45, 52 and 63. After dental hygienists (i.e., respondents) agreed to participate in this study, their dentist-employers were also invited to participate in the study. A brief description of our study was sent to the dental hygienists to inform and invite their dentists to participate. The dental hygienists from all six dentist practices agreed to participate, but one dentist-employer (the employer of respondent 41) refused to participate based on religious grounds. In our attempt to find a comparable substitute, we selected respondent 38, but he/she wished to remain anonymous. Thus, we selected respondent 57, but he left his job shortly after our survey. Finally, respondent 25 was selected and agreed to participate in the study. Given the provided reasons for the refusal, we cannot see any systematic biases. Table 3 provides an overview of the selected respondents and their characteristics, and Table 4 presents the main characteristics of the six selected practices. In Section 3.4 case numbers are replaced by the name of countries according to cases' specific characteristics.

Table 3. Selected respondents and their characteristics

Resp.	Job content	Practice size	Autonomy*	Job satisfaction*	GNS*
4	Medium CARE and CURE	Solo	5.00	5.00	2.50
13	Medium CARE and CURE	Middle	3.75	3.89	2.92
25	Expended	Large	4.00	3.56	3.50
45	Medium CARE	Large	3.75	2.67	2.33
52	Medium CARE	Solo	4.00	3.89	2.42
63	Expended	Middle	4.60	5.00	3.42
Refusal by:					
41	Expended	Large	4.00	3.44	3.00
38	Medium CARE and CURE	Large	4.67	3.89	4.17
57	Medium CARE	Large	4.00	3.11	2.83

* Range 1-low 5-high

Table 4. The main characteristics of the six selected practices, practice size in terms of number of treatment chairs and the total work week of all workers (expressed in full-time equivalent (FTE) based on a 40-hour week)

Case number	4	13	25	45	52	63
FTE dentist	1	2	2.6	3.3	1.3	0.7
FTE dental hygienist (DH)	0.4	1.7	0.2	0.6	0.4	1.3
FTE prophylaxis assistant (PA)	1.6	1	0.4	5.8	0.1	0
FTE dental assistants (DA)		3	2	4.2	1.2	0.7
FTE secretaries	0.9	1	1.6	2.1	0.6	0.8
FTE other personnel	0.3	2	1.7	3.5	0.2	1.8
Total FTE	4.2	10.7	6.5	19.5	3.8	5.3
n personnel	7	14	15	35	8	8
FTE ratio dentist: DH + PA +DA	1:2	1:2.9	1:1	1:3.2	1:1.3	1:2.9
N dentist chairs	3	5	3	10	3	3

2.2.2 Data collection

2.2.2.1 Interviews

The interviews were performed between September and November 2008. One dentist was interviewed at her home, and all other participants were interviewed in the dental practice (in the treatment room, conference room or a coffee corner within the practice). The interviews lasted between 44 and 82 min. The interviews with dental hygienists opened with questions about their working hours, starting

date, and the current scope of their practice. The interviews with the dentists started with questions about working hours, graduation year, years of experience, and the practice size in terms of the number of workers and the total work hours for different occupations. In both interviews, the dentists and the dental hygienists answered questions about their attitude toward task redistribution, their ideal view on the cooperation between dentists and dental hygienists, their professional relationship and communication in the practice.

A paper version of the interview schema, with all of the questions and space for notes, was used during the interview. Most questions were open, and limited answer formats were prestructured for some questions. All themes were discussed in all interviews, and additional questions were used as needed. Notes were made during the interview, and all of the interviews were taped with the permission of the participants.

At the end of the interview, the dentists completed a short questionnaire containing 13 job satisfaction questions, which the dental hygienists had already filled out in their survey.

2.2.2.2 Patient questionnaires

To gain insight into patients' perception of the care provided in our cases/practices, patient questionnaires were obtained in all six practices included in the present study.

The population included patients above the age of 18 years who were able to fill out the questionnaire independently, patients with no mental disorders and those speaking Dutch. We consecutively distributed 200 written questionnaires per practice.

The questionnaires were distributed by a secretary or a receptionist, and patients of all practitioners were given the questionnaire (i.e., not only patients of the dental hygienist and/or the dentist who participated in the interview). Patients completed the questionnaire anonymously and returned it by post directly to the researcher.

The patient questionnaire was based on the Dentist Visit Satisfaction Scale (Corah, O'Shea, Pace & Seyrek, 1984) and supplemented with questions specifically related to our research objectives (Appendix III). The following extra items were included: age, gender, treatments the patient received over the past year, the preference for a specific occupation/profession (dentist, dental hygienist or prophylaxis assistant) if specific treatments were needed, and the grade for the received care and the communication in the practice. The respondents were also invited to provide comments on the received care and the practice in general.

2.3 Conclusion

Data from different designs were used in order to answer different research questions (Table 5). In Chapter 3 we combined the survey and case study data in order to get insight in factors/processes affecting task redistribution and workers job satisfaction in dental practices. In Chapter 4 we only used the survey data on perceived job characteristics to assess the dimensionality of JDS in different subsamples. In Chapter 5, in different subsamples, we performed tests on the relation between job content one the one hand and perceived job characteristics and job satisfaction on the other hand.

Table 5. Research questions and data used

Research question Study	RQ1	RQ2	RQ3
Survey study	X	X	X
Case study	X	--	--

Chapter 3
Influences on work structuring and job satisfaction: A qualitative multi-level analysis

3.1 Introduction

The changes in education and legislation of the dental hygiene profession were meant as governmental stimuli for more task redistribution in Dutch oral healthcare. The expectations were raised that a task redistribution policy would substantially change the task division and work structuring in oral healthcare. The literature, however, reports expectations of limited effects of the government's policy and accompanying interventions in oral healthcare structure in different countries. In this chapter, we reviewed the extant literature on these changes in a societal context. Then, we focused on organizational and individual factors/processes that affect the work structure in oral healthcare. This resulted in an initial model, which was refined through an in-depth analysis of six selected cases.

3.1.1 Societal context

A previous German study of a related healthcare domain demonstrated the modest influences of institutional changes on task redistribution (Luzio di, 2008). After changes in the organization of healthcare in Germany, which included shifting tasks between occupations, government policies provided few incentives for reduction in medical dominance and better cooperation (Luzio di, 2008). In the oral healthcare domain, a US study on the actual delegation of expanded tasks to dental assistants and hygienists concluded that one should not assume that reducing legal restrictions on delegation will produce a dramatic increase in task delegation because of many organizational and individual factors (Chapko et al., 1985). In Norway, the governmental interventions were directed toward dental hygienists acting as dentists' substitutes and as an entry point to dental services. Based on dentists' and dental hygienists' attitudes toward these government actions, Abelsen and Olsen (2008) concluded that no major changes in task division between dentists and dental hygienists are expected. Based on dentists'

and dental hygienists' own attitudes, similar conclusions were drawn in Australia (Hopcraft, McNally, Ng, Pek, Pham, Phoon, Poursoltan & Yu, 2008). Indeed, the Australians concluded that governmental efforts to extend dental hygienists' job content and to anticipate the future shortage in the supply of dental services will have a minimal impact on the care delivery structure due to many organizational and interprofessional reasons.

There is no evidence for the effectiveness of formal changes in education and legislation on task distribution between professions (Table 6) and the existing studies on oral healthcare have not studied the actual changes in task redistribution. Therefore, the current study aimed to track the effects of governmental interventions in the legal and educational system over time.

Based on the studies expecting that governmental interventions alone would not substantially change the task distribution between professions, especially when one profession is dominant, we investigated what other factors might affect the task redistribution in a situation of formal government-initiated changes. In addition, we examined the conditions needed for such formal changes to take effect at the societal level. In Section 3.1.2, we discussed the literature on societal context other than formal governmental interventions. This discussion led us to expect that factors and processes at the meso level of individual dental practices may be decisive for or at least codetermine task (re)distribution within the system of professions. In Sections 3.1.3 and 3.1.4, we reviewe the literature on organizational and respectively individual factors that influence the task division in oral healthcare practices.

3.1.1.1 Interprofessional relationship between dentists and dental hygienists

According to Adams (2004b), interprofessional conflict and professional projects of oral healthcare occupations are far more important than governmental decisions in determining the work structure within oral healthcare delivery. A central theme in the literature about the history and the professionalization of dental hygiene is that dentists and dental hygienists have different views on dental hygiene. This has been reported in the Netherlands and in other countries. Furthermore, the literature shows that these two professions have constantly been fighting over jurisdiction in their domains (Adams, 2004b), which agrees with Abbott's (1988) description of the system of professions being characterized by interprofessional conflict. The factors and processes Abbott describes may have been influential for the task shifting between dentists and dental hygienists, especially given the fact that one of these groups has historically been dominant (see Section 1.3.1).

Initially, dentists feared dental hygiene as a new profession (Adams, 2003) and thought of dental hygienists as a potential source of competition. Indeed, dentists thought that controlling hygienists could be difficult, and dental hygienists would branch out from their limited scope of practice and threaten dentists' legitimate

authority. Currently, discussions are ongoing regarding the possible further expansion of the dental hygienists' scope of practice. From a dental hygiene perspective, Luciak-Donsberger (2003) argued that the opposition to the dental hygiene profession is often rooted in social norms, which leads to a lack of awareness of the role dental hygiene plays in high-quality oral healthcare and the promotion of public dental health. Many of the original fears of dentists can be overcome once they realize the benefits of dental hygiene practice (Luciak-Donsberger, 2003).

From a sociological perspective, Adams (2004b) agrees with Abbott and considers the phenomenon of resistance to dental hygiene to be more complex than proposed by Luciak-Donsberger (2003). Adams describes the interprofessional conflict between Canadian dentists and dental hygienists. Dental hygienists wanted to expand their scope of practice and gain the position of a primary care provider; however, dentists stated that it was *a short jump from a primary care provider to the primary care provider*. Furthermore, dentists are striving to maintain their control over this jurisdiction; otherwise, they are relegated to the role of the specialist seeing patients only on referral from dental hygienists. The main issue in this interprofessional conflict is the dental hygienists' scope of practice, but the question of *who does what* is less important than the questions of *who sees the patient first* and *who has the authority* to diagnose dental problems. Broad expansion of the dental hygienists' scope of practice in Australia was also vigorously opposed by dental associations, which voiced concerns related to the lack of education and potential compromises to public safety (Hopcraft et al. 2008). A similar process was reported in the USA when dental hygienists met dentists' resistance in gaining the right to introduce dental hygiene practices (Kitchener & Mertz, 2010). The majority of dentists in Hong Kong are satisfied with the performance of their dental hygienists, but only a few of them would also support expanded duties for dental hygienists (Fung, Schwartz, Tong & Wong, 1996). In a study by Abelsen et al. (2008), even dentists who were willing to delegate more tasks to dental hygienists showed resistance to the proposition for dental hygienists to act as a primary care provider. Dentists are not willing to relinquish the power to decide which patients should be treated by which profession (i.e., *delegating power is clearly a more serious kind of delegation than handing over certain responsibilities,* Abelsen et al., 2008 p. 565).

In the Netherlands, dentists and dental hygienists strongly differ in their opinions about the direct access of patients to dental hygienists. Most dental hygienists are positive toward this development (i.e., patients having direct access to hygienists) because of the chance to provide more preventive care without a dentist's referral and the professionalization of dental hygiene. In general, dentists are more skeptical because of the lack of patient screening before their visit to a dental hygienist, possible overtreatment and less transparency between occupations for

patients and insurers (Schuller, Overbeek van & Ooijendijk, 2006). Table 6 shows an overview of the findings on task delegation in different countries.

Table 6. Studies on task delegation and work structure between dentists and dental hygienists

Study	Country	Study aim	Findings
Chapko et al., 1985	USA	Identifying possible factors for task delegation	Several personal and organizational factors identified; reducing the legal restrictions will not produce a dramatic change in the work structure.
Fung et al., 1996	Hong Kong	Identifying the factors for employment status of dental hygienists	Dentists satisfied with their dental hygienists, but only a few of them would support expansion of their scope of practice.
Adams, 2004b	Canada	History of interprofessional conflict	Dentists do not support expansion of dental hygienists' scope of practice or hygienists gaining the position of a primary care provider.
Schuller et al., 2006	The Netherlands	Attitude study	Dentists skeptical toward dental hygienists gaining the position of a primary care provider.
Abelsen & Olsen, 2008	Norway	Attitude study	Dentists' had a negative attitude toward expansion of dental hygienists scopes of practice; therefore, no major changes in work structure are expected.
Hopcraft et al., 2008	Australia	Attitude study	Dentists' had a negative attitude toward expansion of dental hygienists scope of practice; therefore, no major changes in work structure are expected.
Kitchener & Mertz, 2010	USA	The position of the dental hygiene practices	High dentist resistance to introduction of dental hygiene practices.

In conclusion, the conflicts in the interprofessional relationship between dentistry and dental hygiene can be interpreted in terms of Abbott (1988). Abbott's empirical studies, however, are essentially based on the macro level (Bureau & Suquet, 2009). Abbott claims that the dynamics within an organization are quite different from those that occur on the macro level, where an intra-organizational division of labor replaces an interprofessional one. Abbott's only explanation for these differences between dynamics at the macro and meso levels is that the

interprofessional boundaries present in jurisdiction tend to disappear in worksites because these boundaries tend to accommodate organizational imperatives in so-called *workplace assimilation* (Bureau & Suquet, 2009). We argue that the macro and meso levels are interdependent. Trends at the meso level may be *translated* into macro-level changes. An example is the introduction of dental hygiene practices in the USA, which were eventually institutionally legalized (Kitchener & Mertz, 2010). Conversely, changes in interprofessional boundaries at the macro level become nearly meaningless when they are not reflected in the task division at the meso level. To better understand the lack of change at the meso level following governmental interventions, we aimed to complement Abbott's view on competition at the level of professions within society with an analysis of the contribution of organizational and interpersonal factors that may be decisive in the development of job content.

Based on previous studies of the possible effects of institutional changes on the work structure and the gap mentioned in Abbott's approach, we investigated factors/processes influencing the process of task division in dental practices, given that the institutional changes occurred. Below, we present the literature about the organizational and (inter)personal factors affecting task delegation.

3.1.2 Organizational factors

Part-time employment of dental hygienists may negatively influence task delegation (Chapko et al., 1985; Bruers et al., 2003). One of the factors that may negatively influence the task delegation of extended tasks is a conflict with the hygienist's traditional role of performing oral prophylaxis in combination with the high care demands in prophylaxis and periodontology (Chapko et al., 1985). Other tasks would only be delegated to dental hygienists if they had time above their primary tasks in oral prophylaxis. Interestingly, several studies reported that a lack of available hygienists and limited treatment chairs affected task delegation to dental hygienists (Gibbons, Corrigan & Newton, 2001; Hopcraft et al., 2008; Pourat, 2009; Fung et al., 1996). The short supply of dental hygienists, in combination with their primary role in prophylaxis and periodontology, may hinder the ability of dental hygienists to develop extended tasks and take over tasks from dentists. Studies have suggested that more dental hygienists are required to answer the actual care demands, and allowing dental hygienists to provide extended tasks would eventually increase task delegation (Christensen, 1995). In addition, a sufficient number of patients could influence task delegation because dentists prefer to perform all tasks by themselves if they lack patients (Fung et al., 1996; Chapko et al., 1985). A possible risk of income loss was also reported as a reason for not delegating tasks to dental hygienists (Abelsen et al., 2008). In addition, practice size may affect task delegation. Indeed, dental hygienists are more often employed in larger practices, and more tasks are delegated to hygienists in larger offices, which is related to the high business costs of employing dental

hygienists and not being able to keep them busy enough in small practices (Pourat, 2009; Bruers et al., 2003).

3.1.3 Individual factors

3.1.3.1 Individual factors of the dominant profession

Dentists' personal characteristics - Several dentists' personal factors were found to influence the delegation of tasks to dental hygienists. First, dentists' attitudes toward dental hygiene affect task delegation (Chapko et al., 1985). Secondly, their management skills, in terms of demands in managing large practices with more employees, affect task delegation (Faltin & Hoogstraten, 2000). Thirdly, dentists' preferred mix of relaxing and demanding work, instead of a day filled with complex treatment challenges, is a reason for not delegating routine tasks to dental hygienists (Abelsen et al., 2008). Fourthly, dentists with more demand for preventive care are more likely to employ dental hygienists (Breurs, Felling, Truin, Hof van 't & Rossum van, 2004; Pourat, 2009). In addition, dentists who are more prevention-inclined are also more willing to delegate tasks to dental hygienists (Bruers et al., 2003). Finally, a study in Indiana, USA, suggested that a dentist's year of graduation appeared to be a significant factor for the extent to which he/she employed dental hygienists and shifted tasks to dental hygienists (Cooper, 1993). Interestingly, recently graduated dentists are more likely to employ dental hygienists, work in larger practices and delegate more tasks to dental hygienists.

Dentists' attitudes – The interpersonal relationships between dentists and dental hygienists may also influence the process of task division in a practice. Dentists must feel comfortable about delegating complex tasks, which means that they must have confidence in their staff (Faltin & Hoogstraten, 2000; Chapko et al., 1985). The most important factor for dentists to delegate tasks is their perception of competence, trust and the appreciation that they have for other dental workers (Faltin & Hoogstraten, 2000). Indeed, managers have reported that strong mutual trust and confidence in staff competence are important factors for delegating tasks (Yukl & Ping Fu, 1999). Dentists have lower trust in other workers when delegated tasks include a decision-making process, which means that they are more often willing to delegate a simple task instead of a task including a decision-making activity (Faltin & Hogstraten, 2000). Falting and Hoogstraten (2000) reported no empowerment of dental workers; rather than dentists adapting to other workers, the dentists made all of the decisions, and the other workers needed to adapt to their policies. The service quality provided by dental hygienists and the value of their work for the patients was recognized by dentists the main reasons for employing and cooperating with dental hygienists (Hopcraft et al., 2008; Uitenbroek et al., 1989). Both the Hopcraft et al. and the Uitenbroek et al. studies also noted that dentists who did not work with dental hygienists had lower perceptions of the quality of care delivered by hygienists (Hopcraft et al., 2008;

Uitenbroek et al., 1989). Interestingly, the lack of education of dental hygienists and potential compromises to public safety are often mentioned by dentists as reasons for not delegating tasks to dental hygienists (Adams, 2004b; Schuller et al., 2006; Hopcraft et al., 2008; Kitchener & Mertz, 2010).

3.1.3.2 Individual factors of the subordinate profession

Few studies have examined dental hygienists' individual factors in relation to task delegation and/or task redistribution. This is likely because the less powerful professional group is expected to have less influence on the task division. Only the survey of Brian and Cooper (1997) reported that the majority of dental hygienists felt adequately trained to perform advanced hygienist skills (e.g., sealants and placing temporary and amalgam restorations), which indicated a high perceived self-efficacy (Bandura, 1977) among these dental hygienists.

3.1.4 Interaction between job content and job satisfaction

The present study aimed to develop a model of factors that influenced task division and investigated the link between job complexity and personal outcomes in Abbott's theory and in JCM, at a different level of analysis. In both theories, job complexity is a determinant for personal outcomes in terms of professional status (in Abbott's theory) and job satisfaction (in the JCM). Moreover, workers' job satisfaction is considered an indicator for organizational performance. Therefore, we included workers' job satisfaction as a dependent variable in our study.

In addition to the expected effects on increased care supply and increased efficiency, task redistribution is also expected to increase job satisfaction in the involved occupations (RVZ, 2002; Commissie Innovatie Mondzorg, 2006). The expected increase in job satisfaction is based on the scenario that all occupations would perform jobs at the level that they are educated for, and there would be more room for professional development. Three main sets of variables affecting job satisfaction among dental hygienists have been reported: demographics, work characteristics and social support at work (Ylipää et al., 1996). In our study, we focused on the work characteristics in relation to the job satisfaction of dental occupations. The next paragraph presents a few studies on the work characteristic determinants that affect job satisfaction among dental occupations.

Several studies have already demonstrated a relationship between job content and job satisfaction in dental occupations (Joeng, Chung, Choi, Sohn & Song, 2006; Wells & Winter 1999; Calley, Bowen, Darby & Miller, 1996; Bader & Sams, 1992; Ylipää et al., 1996). Approximately 35% of the variation in dentists' overall job satisfaction is explained by patient relations, perception of income, personal time, staff and specialty training (Joeng et al., 2006). The intrinsic reward of delivering dental health services was also identified as a determinant of job satisfaction among dentists (Wells and Winter, 1999). Dental hygienists' job satisfaction is mainly determined by variety in the scope of their practice (Calley et al., 1996),

their supervisor's management skills and interpersonal relationships (Bader & Sams, 1992). Skill development, together with the influence over job variation, is an important determinant of job satisfaction among Swedish dental hygienists (Ylipää et al., 1996). With regard to work characteristic variables, dentists' job satisfaction is mainly explained by patient relationships and intrinsic rewards, which are identified as task significance, whereas dental hygienists' job satisfaction is mainly explained by task variety and skill development.

Among the job satisfaction of involved workers, patients' satisfaction also indicates organizational performance. Therefore, we included patient satisfaction as an additional indicator for organizational performance in terms of service quality. There are no studies of the effect of task redistribution in oral healthcare on a patient's perception and satisfaction. Early literature, however, suggests that patients' acceptance of an auxiliary's role is dependent on dentists' support of this role, and patients are willing to accept more routine procedures from an auxiliary than dentists are willing to delegate (Baltutis & Morgan, 1998). The most recent study of patients' perception of Dutch oral healthcare (Hansen et al,, 2010) revealed that patients like to have choices between occupations. Indeed, patients are familiar with the different level of education of dental occupations, and they prefer to be treated by dentists for oral checkups and restorations. Patients who have experience with dental hygienists, however, are more likely to choose to be treated by a hygienist compared with patients who do not have experience with dental hygienists. In conclusion, there is no evidence if and how local task division in dental practices affects organizational performance in terms of patients' satisfaction and the perceived care delivery in dental practices. In this study, we measured patient satisfaction with the care delivered in practices with different task division between occupations.

3.1.5 Research question

As we concluded earlier, the influence of education and legalization factors on local work structuring is unknown. The literature suggests that also many organizational and individual factors of dentists and dental hygienists affect task delegation and task division in dental practice. Therefore, this chapter focused on all three levels: societal, organizational and individual factors of dentists and dental hygienists in relation to task division. In our study, we aimed to identify the factors influencing task division and gain insight into the processes behind those factors by means of a longitudinal study and case studies (Figure 4). The actual division of tasks, job satisfaction of the workers involved and patient satisfaction were measured as the outcomes in this study. The based this study on the following research question:

RQ1: Which societal, organizational and individual factors contribute to the extent to which dentists delegate tasks to dental hygienists, and how does the resulting task division influence workers' job satisfaction and patient satisfaction?
In the following pages, the factors on three different levels are discussed.

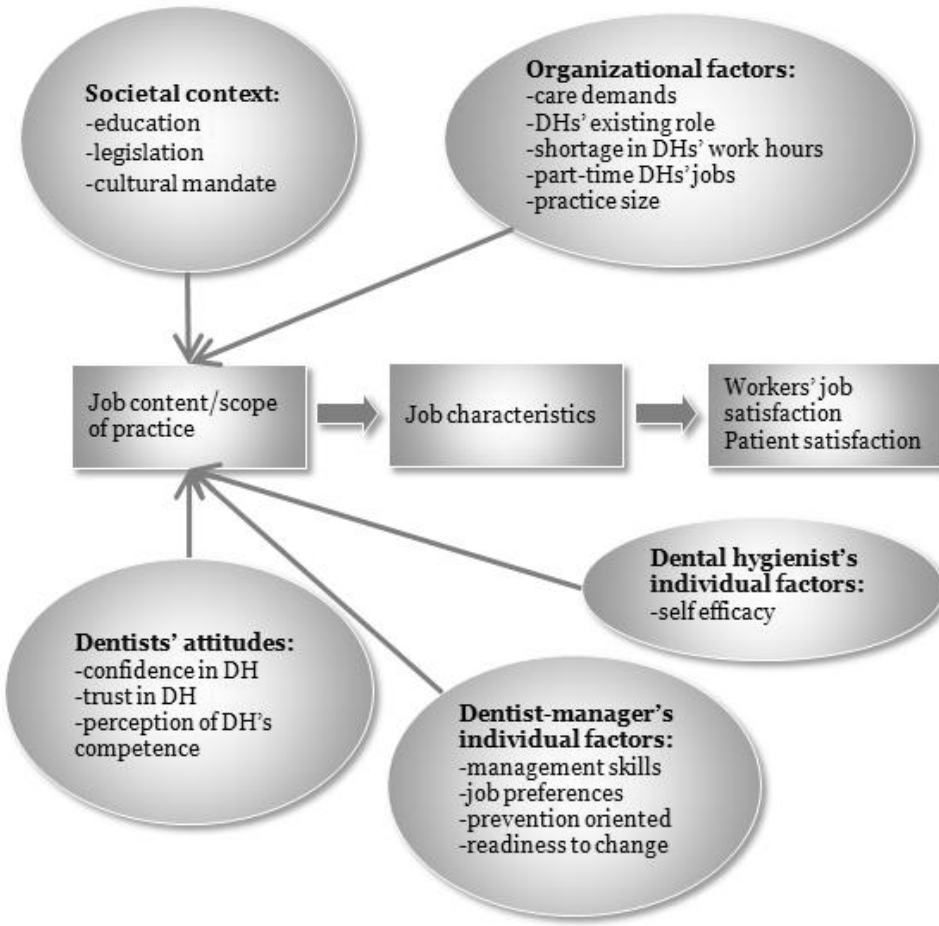


Figure 4. Initial model of the potential factors influencing task division in dental practices and different outcomes indicators

3.2 Data analysis methods

The findings with regard to the dental hygienists' job content within the societal context are based on our four surveys. The findings with regards to the organizational and individual factors are based on our six case studies and, where relevant, on the survey data. In this section, the required data analysis that we conducted is described. First, we describe the analysis of the survey data and than of the case study data.

3.2.1 Survey

3.2.1.1 Data reduction

The number of variables of job content was reduced by grouping tasks based on factor analysis with Varimax rotation performed on the new style dental hygienist population. The old style 2 questionnaire consisted of the same items; therefore, the task groups from our factor analysis were also used in the old style 2 group. Twelve of the 73 items in the questionnaire were excluded from the factor analysis and any further analysis for several reasons (e.g., some tasks were not comparable to any other task regarding their level of complexity or their content and other tasks hardly ever occurred) (Appendix IV).

Two factor analyses were performed: one analysis was performed on the 54 items involved in direct patient care, and the other analysis was performed on the 7 items in indirect patient care. Subsequent reliability analyses were performed on each of the 12 task groups obtained in the factor analysis.

From the questionnaire in the old style 1 group (consisting of 39 items), items were divided into the 12 task groups already defined in new style 1. Some groups consisted of fewer items, and four task groups were not represented at all in the old style 1 sample.

3.2.1.2 Comparison of job content between different subsamples

Because many dental hygienists combine two or more jobs, our analyses were based on the data from a single practice in which the dental hygienists work the most hours per week. Independent *t*-tests were used to compare the job content of the old- and the new style dental hygienists, and dependent *t*-tests were used to compare the job content within the same population over time. The comparisons between the old and the new style group were based on data from 2009 (i.e., the old style 2 subsample and the new style 2 subsample+ 17 respondents from the 2007 wave who did not participate in 2009 wave).

3.2.2 Case study

3.2.2.1 Qualitative data within the cases

Data gathering in the case studies was described in Chapter 2. In total we performed 13 interviews; in five practices dentist-owner and dental hygienist were interviewed and in one practice, dental hygienist-owner of the practice, dentist- in employment and new style dental hygienist were interviewed.

The analysis of qualitative data consisted of three concurrent flows of activity: data reduction, data display and conclusion drawing/verification (Miles & Huberman, 1994) (Figure 5).

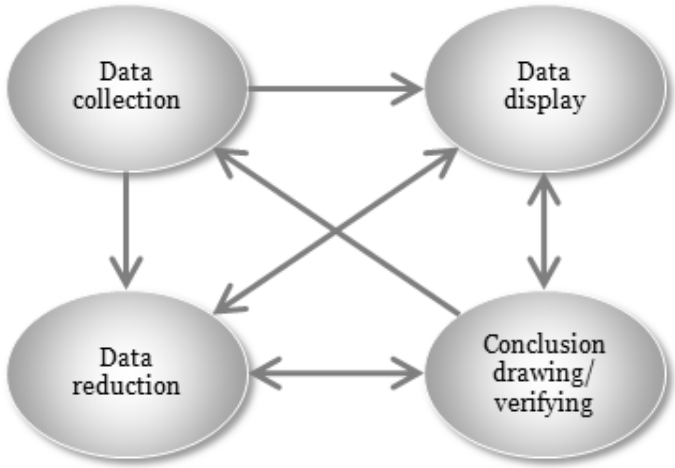


Figure 5: Components of data analysis: interactive model (Miles & Huberman, 1994)

All 13 interviews were audiotaped and transcribed verbatim. Data reduction refers to the process of selecting, focusing, simplifying, abstracting and transforming the data from these transcriptions (Miles & Huberman, 1994). To reduce our data, all transcriptions were inserted into ATLAS.ti: qualitative data analysis software, where the data were coded. In total 125 codes were retracted.

Based on these 125 codes, data were displayed in the form of an extended text (i.e., a thick description of the specific situation). The next groups of variables were included in the description of the cases and were the input for single and subsequent cross-case analysis:

1. The setting – organizational factors, practice characteristics and interviewees' characteristics;
2. The current state of task division - the job content of different occupations;
3. The interpersonal relationship between dentists and dental hygienists;
4. Dentists' and dental hygienists' attitudes and perspectives on developments in task redistribution;
5. The aspects of dentists' willingness to distribute more tasks;
6. Workers' job satisfaction and patient satisfaction.

The third stream of analysis activity, conclusion drawing and verification, started with a six-hour meeting with three researchers. First, a within-case analysis was performed, and the case findings were discussed to identify the themes and trends, formalize the elements of the story and locate the key variables. In the process of

falsification, we actively searched for alternative explanations and systematically discussed the role of the possible explanations for each case. Tables were drawn, and – or + scores were used to indicate what kind of influence each factor had on the current task division in a practice. All data were available during the discussion and used to search for source variables in case of doubt. We constantly used the qualitative and quantitative data to better interpret variables and seek alternative explanations. For example, if patient satisfaction was graded as a 7 on a scale of 1 to 10, the qualitative data were used to gain insight into the reasons for this score.

We also performed a cross-case analysis by investigating the relationship between variables in different cases and the influence of each identified factor on the dependent variables between cases.

Our attempt to understand the concepts led to iterative/refined definitions. For example, clear differences were found in task division in caries patients and patients with periodontal diseases. In cases of caries patients, task division was based on a single task, whereas task division of patients with periodontal diseases was often based on the patient level (i.e., the complete periodontal care of the patient was distributed to the dental hygienist). Furthermore, we often referred to the dental hygienists' *traditional scope of practice* to describe their main tasks in prevention and periodontology. In our discussion, the question arose as to who decides that some tasks are included in the traditional scope of practice, education, legalization or the work field. Therefore, this concept is specifically defined as the scope of practice of the first generation of dental hygienists who received a 2-year education.

3.2.2.2 Quantitative data within the cases

Quantitative data on perceived job characteristics, the role conflict, role ambiguity and the job satisfaction of dental hygienists (i.e., participants in the case studies) were obtained in the survey and included in the case study. In addition, data on the job satisfaction of dentists (participants) and prophylaxis assistants were gathered directly after the interview with the dentist.

Patient satisfaction was measured by the Dental Visit Satisfaction Scale (DVSS) (Corah et al., 1984; Stouthard, Hartman & Hoogstraten, 1992). Ten items with a Likert response format of five categories were grouped in three subscales: information-communication, understanding-acceptance and technical competence. We calculated means and standard deviations for each subscale and a total DVSS score.

3.3 Contribution of the societal context

Although the literature does not provide evidence for the effectiveness of formal governmental interventions on task distribution between professional groups

(Section 3.1), previous studies have suggested that governmental efforts to extend dental hygienists' scope of practice will have minimal impact on the care delivery structure due to many organizational and interprofessional reasons. Interestingly, the effects of governmental interventions on the legal and educational system in dental hygiene have never been measured. Therefore, before discussing the organizational and individual factors for task division in dental hygiene, we examined the possible effects of governmental interventions on the legal and educational systems. We measured current job content between different groups of dental hygienists and within these groups over time to investigate how societal factors impacted the expansion of dental hygienists' job content.

In this section, we describe the influence of societal factors on the current task division between dentists and dental hygienists and, if relevant, the influences on perceived job characteristics and job satisfaction. We describe the role of education and legislation with the accompanying publicity on dental hygienists' new scope of practice. Based on the previous literature on task delegation in dentistry within a society, we know that other political and economical factors can also affect task division, such as cultural mandates and a shortage of dental hygienists.

3.3.1 Education and legislation

Task delegation to dental hygienists was already an ongoing process for several years before the government decided to support this development by changing education and legislation for dental hygienists. Based on incentives from the work field, the government took actions regarding new education and legislation of dental hygiene, which were directed to bring the task delegation to a higher level to solve the high care demands in oral healthcare (Figure 6) (Section 1.2.3.3). The government actions required dental hygienists to learn how to perform new tasks *and* take the responsibility and the authority for the tasks that they perform. Beginning in 2002, the extended tasks were included in the new four-year dental hygienist education. The legislative changes made dental hygienists directly accessible professionals, and since 2006, a dentist's referral has not been necessary to visit a dental hygienist.

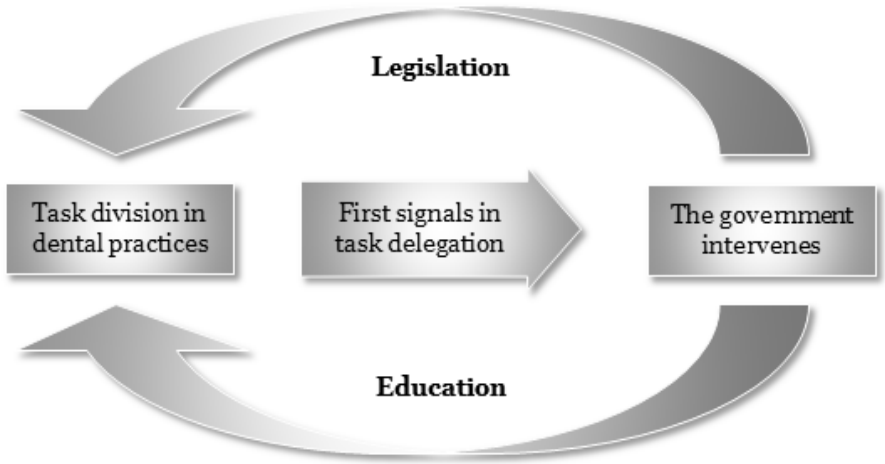


Figure 6. Societal context: the first signals and the government's two methods of stimulating task redistribution

An important aspect playing a role in the current task distribution between dental professionals is the publicity for the dental hygienists' extended scope of practice; neither the dentists nor the patients were fully informed about the changes in dental hygienists' scope of practice and the direct accessibility. Because most dentists were not familiar with the new dental hygienists' extended scope of practice, dental hygienists with a Bachelor of health degree in our survey reported having to inform potential employers about their competencies.

Moreover, patients are not informed about their ability to visit a dental hygienist without a dentist's referral and the possibility of getting a dental checkup at a dental hygienist (Van Laar, 2008; NIVEL, 2010). This patient ignorance of the function and direct accessibility of the dental hygiene profession interferes with the further development of task distribution. The patients do not consider visiting a dental hygienist on their own because most patients are used to visiting dentists.

3.3.2 Social political dimension: cultural mandate

In this section, we argue that the lack of cultural and organizational mandates of these new style dental hygienists could greatly influence their job content. Cultural mandate is formed by two aspects: self-confident precursors and the professional community's acknowledgment of the tasks to be performed by the new group (Nelson & Barley, 1997). What is neglected in cultural mandate are parallel streams of other professionals influencing the success or failure of dental hygienists' sustainable development (Nelson & Barley, 1997), which Abbott introduces in his work. The reason that other professionals can influence dental hygienists' development is the so called *gray area* in the scope of practice between the professions and/or the overlap in tasks, which is in line with Abbott's theory. In the

dentistry field, three professions (dentists, dental hygienists and prophylaxis assistants) work closely together and sometimes *battle* over fulfilling similar tasks. The decision on task division, however, is often made on an organizational level, and practices need to decide which professionals are employed and assigned to certain tasks (Kathan, 2007). Because dentistry involves relatively small organizations, the organizational choices are mostly actions of one or two persons (i.e., owners of the dental practices who may or may not negotiate with their employees).

The precursors in this field (i.e., the newly graduated dental hygienists) are not confident in their extended scope of practice. Indeed, survey figures showed that 56.7% of new style dental hygienists felt a lack of competence to fulfill their current job content. Moreover, 14.2% of new style dental hygienists would like to perform extended tasks, but the dentists do not refer these tasks to dental hygienists.

The second aspect of the cultural mandate (i.e., the professional community's acknowledgment of the tasks that shall be performed by the new group) has been the subject of many discussions between dentists and dental hygienists in the Netherlands. Although decisions are made on tasks to be performed by the new style dental hygienists, there is no full acknowledgment in the professional community.

Aspects such as institutional recognition and cultural mandate are especially important in establishing new occupations. The dental hygienist profession in the Netherlands, however, is not new. In cases of changes in the scope of practice of an existing profession, we would expect that it is not easy to adjust to current beliefs and stereotypes.

3.3.3 Economic dimension: shortage of dental hygienists

There are two aspects playing a role in the economical factor of dental hygiene: the general shortage of dental hygienists in the Netherlands and a shortage of dental hygienists' capacity per practice because of their part-time employment. In both cases, the high demands in periodontal care play a major role. In our surveys, the shortage of dental hygienists, combined with the high demands in periodontal care, was mentioned as a possible limiting factor for the expansion of dental hygienist's job content. Indeed, 21.3% of dental hygienists reported that their schedules were full with periodontal treatments, which limited their opportunities to perform extended tasks. The expectation is that with the increasing number of elderly people with their own teeth, the periodontal care demands will also increase (Commissie Innovatie Mondzorg, 2006), and this will coincide with an even greater shortage of dental hygienists.

3.3.4 Change in dental hygiene's job content

Having described the possible societal contextual factors for task division between dentists and dental hygienists, we examined the question of the current job content of the population of dental hygienists in the Netherlands. We compared the job contents of the old and the new style dental hygienists (i.e., before and after the governmental changes in education and legislation). A time line of our research with regard to the governmental changes is shown in Figure 7.

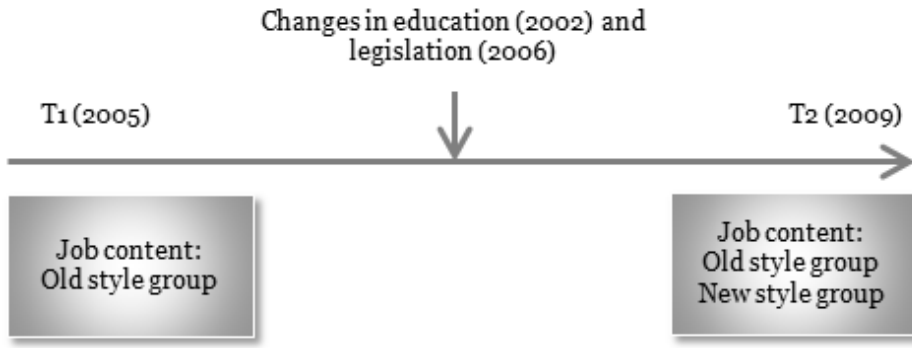


Figure 7. Time line of the research

The demographic data of all subsamples are presented in Table 7. The mean (standard deviation SD) working hours in the new style population was 32.2 (SD=7.5) compared with 27.1 (SD=8.06) in the old style 2 group ($p<.001$). In addition, new style dental hygienists were less likely to work in a dental hygiene practice compared with old style dental hygienists ($p<.001$).

Table 7: Demographic data of the subsamples

Demographic data	Old style 1 n=320	Old style 2 n=412	New style* n=219
Age (mean, SD)	34.8 (9.1)	40.5 (9.1)	26.0 (3.5)
Female (%)	98	98	94
Experience in years (mean, SD)	11.4 (8.3)	16.9 (9.1)	Max 3
Weekly working hours (gem, SD)	27.3 (8.9)	27.1 (8.1)	32.2 (7.5)
% working majority of hours in dental hygiene practices	36.2	42.8	13.3

* Total population of new style, paired measurements are excluded

To define dental hygienists' job content by means of a factor analysis, we combined the tasks into groups of similar tasks. Based on the first factor analysis on the items in direct patient care, ten factors were distinguished. Factor analysis of items in the indirect patient care resulted in two separate factors. In total, twelve different *task groups* were distinguished. Appendix V presents the twelve task groups with the

items included. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.89 and 0.81, respectively, and Bartlett's test of sphericity was significant ($p<0.001$) in both factor analyses. All task groups with the number of tasks and Cronbach's alpha values (all > 0.75) are presented in Table 8.

Table 8. Task groups and results of reliability analysis

Task group	N tasks in Old style 2 and New style	Cronbach's alpha	N tasks in Old style 1	Cronbach's alpha
Intake	2	0.77	1	-
Prevention	4	0.90	4	0.84
Periodontology	7	0.90	4	0.52
Orthodontics	4	0.75	0	-
Local anesthesia	4	0.87	4	0.86
Caries diagnosis and treatment planning*	6	0.88	3	0.64
Caries decision making	7	0.95	6	0.93
Caries executive tasks	13	0.97	12	0.92
Extraction	4	0.83	4	0.80
Evidence-based practice	3	0.81	0	-
Oral healthcare policy	4	0.85	0	-
Scientific research	3	0.88	0	-
Total	61		39	

* In the old style 1 subsample, this activity group only consisted of items on caries diagnosis and no items on caries treatment planning.

In five task groups, there were considerable differences in the frequency of performing tasks between the old and new style dental hygienists (Table 9). Old style dental hygienists performed intakes and preventive tasks more often than the new style dental hygienists (all $p<0.001$). New style dental hygienists, however, performed administration of local anesthesia, caries decisive tasks and caries treatments more often than the old style dental hygienists (all $p<0.001$). In summary, the old style group performed preventive tasks more often, whereas the new style group performed extended tasks in caries treatment in addition to the their preventive tasks.

We did not find any significant movement in changing job contents within the old style group over time. Although statistically significant differences were found in the frequencies of performing tasks in periodontology, we found a high frequency of performing these tasks in both groups (i.e., the mean in both groups was 4.9 on a scale of 1 to 5). Old style dental hygienists performed significantly less tasks in

administration of local anesthesia in 2009 compared with the first measurement in 2005.

Table 9. Task group means (SD) in all subsamples

Task groups	Old style 1 Mean (SD) n=320	Old style 2 Mean (SD) n=412	P-value Old style 1 and 2# t-test	New style Mean (SD) n=219	P-value Old style 2 and New style t-test
Intake	4*	4.1 (1.07)	-	3.6 (1.28)	<0.001
Prevention	4.9 (0.22)	4.9 (0.34)	0.007	4.7 (0.62)	<0.001
Periodontology	4.5 (0.63)	4.4 (0.57)	<0.001	4.2 (0.86)	0.058
Orthodontics	-	1.6 (0.72)	-	1.7 (0.80)	0.085
Local anesthesia	4.1 (1.25)	3.4 (1.20)	<0.001	4.1 (0.95)	<0.001
Caries diagnosis and treatment planning	3.2 (1.05)	3.1 (0.87)	0.159	3.2 (0.99)	0.115
Caries decision making	1.8 (1.09)	1.6 (0.97)	0.135	2.4 (1.31)	<0.001
Caries treatment	1.8 (0.83)	1.6 (0.86)	0.180	2.7 (1.29)	<0.001
Extraction	1.3 (0.66)	1.3 (0.58)	0.087	1.4 (0.75)	0.012
Evidence-Based Practice	-	2.8 (0.83)	-	2.8 (0.95)	0.617
Oral healthcare policy	-	3.1 (1.20)	-	3.1 (1.10)	0.808
Scientific research	-	1.6 (0.88)	-	1.7 (0.92)	0.034

Range 1 – perform these tasks never, 5 – perform these tasks always when needed

* Median.

Based on a comparison between items from the old style 1 subsample only.

3.3.5 Conclusion

In conclusion, the changes in education and legislation have had little effect on dental hygienists' current job content. The core business of both groups of dental hygienists is still the traditional services in prevention and periodontology, but new style dental hygienists combine these tasks with some of their extended tasks in the caries field. Based on the frequencies of performing tasks, however, we concluded that these extended tasks are not structurally performed by dental hygienists. Moreover, there are large differences between the actual task division in dental practices and the government's ideal scenario. The most task distribution we observed was still only based on partial task delegation instead of task redistribution, which was proposed by the government (including the delegation of tasks and corresponding responsibilities and authorities). The only exception was

periodontal care, which was completely transferred to dental hygienists in most cases (i.e., similar to before the new curriculum).

Examining the effects of the mentioned societal contextual factors on the current task division in oral healthcare, we conclude that these factors alone have had little effect on the current task division (i.e., they did not reach the desired level of task redistribution and do not account for most of the variance in job content).

To explain this variance, we focused on the organizations to investigate whether organizational aspects influence the development of task division and dental hygienists' experienced job characteristics and overall job satisfaction. Therefore, we conducted six case studies in practices with different task divisions. The next section describes the within-case analysis followed by the cross-case analysis on the organizational factors in Section 3.5 and individual factors in Section 3.6.

3.4 Organizational and individual factors - within-case analysis

This section provides detailed descriptions of all six practices with all practice organizations and work divisions. The following data were combined to draw as a complete picture as possible for each case:

- Dental hygienists' survey data (T1 and T2);
- Interview data with professionals;
- Data on dentists' satisfaction;
- Data on patients' satisfaction.

For simplicity, cases were named after countries and described by their main characteristics:

- Case 4 – Iceland – isolated in a small village; solo practice with one dentist and one dental hygienist.
- Case 13 – Poland – family business, dentist specialized in periodontology.
- Case 25 – Germany –many German dentists, high turnover.
- Case 45 – United States of America – high work tempo, high productivity.
- Case 52 – Sweden – fully patient-oriented practice existing for 27 years.
- Case 63 – Switzerland –precise, constantly searching for ways to improve quality and service.

The following structures and definitions were used in the case descriptions:

1. Setting

The practice characteristics, type, size, organizational structure, and the main characteristics of the interviewees were recorded. Within the setting, the actual work pressure was measured as the possibility of making an appointment with the dentist or dental hygienist within one month. To indicate the dentists' preventive philosophy, we determined the amount of time spent on preventive treatments. Strategic developments in the last two years, such as expanding the team/practice, purchasing new devices and future plans, were described to indicate dentists' readiness to change.

2. Current task division

Assessment of current task division included the job content of different care providers, the referrals and communication about patient treatments, current coordination and communication between occupations and the level of dentist supervision and responsibility. Here a distinction is made between responsibility and accountability. Responsibility is defined as *an internal dimension in moral and ethical analysis in which individuals take into account the consequences of their actions and the criteria which bear upon their choices* (Agich, 1982 p.. ix). In the medical sector, a new term of *final responsibility* has been introduced, but this term has not been defined any differently than the concept of accountability, which involves the interpretations of punishments, penalties and indemnities imposed by a community to rectify or prevent injuries (Agich, 1982).

3. Interpersonal relationship between the dentist and dental hygienist

4. Perspective on developments in task redistribution

The dentists' and dental hygienists' general views on task redistribution and their views of the *ideal scenario* of the Committee for Innovation in Oral Healthcare are given. The ideal scenario of the Committee for Innovation in Oral Healthcare implies that:

> *In 2016, the primary, secondary and tertiary prevention of caries and gum diseases in the large group of medically uncompromised patients is performed by dental hygienists with a Bachelor of Health degree (with assistance from a prophylaxis assistant).*

Related to the committee's *ideal scenario*, the dentists' and dental hygienists' own ideal scenario of cooperation in oral healthcare is described here.

5. Determinants of dentists' willingness to distribute more tasks

This was described by means of a hypothetical scenario in which a dentist would have confidence in a dental hygienist taking care of his/her patients/tasks if the dentist could not treat his/her patients for one day. According to the literature, the

three main aspects influencing task division between dentists and dental hygienists are: a dentist's view of the supposed competence of dental hygienists, confidence in dental hygienists and appreciation for dental hygienists. The views of both the dentist and the dental hygienist on these three determinants are described in this section, as well as the view on further distribution of tasks to dental hygienists and/or assistants and dentists' experiences in cooperation with dental hygienists.

6. The dependent variables

Task division, job satisfaction of the professionals involved and patient appreciation of the care in a practice were considered to be dependent variables in the research. In the last part of the case descriptions, we described the main identified variables within a practice and individual factors of dentists and dental hygienists that might influence task division and worker and patient satisfaction in a practice.

3.4.1 Iceland case

3.4.1.1 Setting

This practice, which had one dentist, one dental hygienist and four assistants, is situated in a small village in the northern part of the province North–Holland. There are three dentist chairs and approximately 3,650 patients. The ratio between dentists and other occupations involved in patient care (i.e., dental hygienists, prophylaxis assistants and dental assistants) is 1:2.

The dentist-owner (male) has 13 years experience and has owned this practice for several years. He works 40 h per week in patient care and a few hours per week for extra tasks as the owner.

The dental hygienist (23-year-old female) has worked in this practice 16 h per week for two years, and she also works in another general dental practice 16 h per week.

It was possible for patients to make an appointment with the dentist and the dental hygienist within one month. The dental hygienist's schedule varies, and sometimes she has a lot of openings in her schedule.

The strategic development over the last two years was characterized by the dentist as increasing task delegation, first to the dental hygienist and later to the assistants. The future strategic changes are directed at the expansion of the practice and his team by hiring more assistants. The dentist was satisfied with the total time spent on prevention, which he estimated to be 30%.

3.4.1.2 Current task division

The dental hygienist in this practice saw herself as an *all-round dental hygienist*; she liked the variety in her job and did not want to specialize in one particular field. If this dental hygienist would like to specialize in a specific field, the dentist would

absolutely support her decision. She explained that her job mostly included tasks in the field of prevention and periodontology. She occasionally placed sealants and performed approximately one filling per day. She did not perform dental checkups, which was her own preference because of her lack of experience, but she would like to perform dental checkups in the future. When she began working in this practice, she informed her employer about her competencies, which were the basis for the current scope of practice that was created for her.

In the dental hygienist's scope of practice, there is a difference in task division with regard to patient's treatment needs. Within periodontal care, all aspects of screening and treatments of periodontal diseases, including the decision-making process, are part of the dental hygienist's scope of practice. In patients with caries, however, task division is based on delegation per task, not per patient. The dental hygienist stated:

> I sometimes spot a cavity during my hygiene treatment, but I first ask for the dentist's permission to treat the cavity, or the patient has to make another appointment with the dentist.

Two prophylaxis assistants work in this dental practice, and they give instructions in dental hygiene, remove calculus and place dental sealants. Prophylaxis assistants do not have their own patient schedule; these treatments are arranged within a patient's visit to the dentist.

The dentist and the dental hygienist always inform patients if they are referred to the other occupation within or outside this practice. According to the dental hygienist, some patients are not familiar with having their cavities treated by a dental hygienist:

> Sometimes, they find it odd, but when I explain that I graduated from the new 4-year curriculum, they find it good.

There are no structural consultations with the workers in this practice. Everything happens between appointments; consultations about the treatments and other type of consultations. The dentist feels no need for structural consultations.

There is ample time for the dental hygienist to consult the dentist if she is uncertain about a treatment, and he expects her to do so. The dentist stated:

> If I want to see a result of the treatment, I say so. This is related to the fact that I am ultimately responsible for what is performed; I am accountable for it. Therefore, I sometimes want to see what is done. This is a part of the supervision of the dental hygienist, especially in the beginning, and I want to see some things. That was easier when she was in the next room; you walk

> faster back and forth. At a certain point of time, you see that it is going well and then you let go as much as possible.

This practice works with software where the dental hygienist can make a note if she needs the dentist's assistance, although they only started using this software few months ago. In addition, the dentist and hygienist sometimes treat patients by turns within the same visit.

The dentist assumes the *final responsibility* for patients referred to the dental hygienist, and he wants her to consult him if something goes wrong. The dental hygienist feels only responsible for the treatments she performs:

> The patients are not mine. They are referred to me, but I feel responsible for everything I do. That is the way I see this.

Furthermore, she stated that if some task was not in her scope of practice, she let the dentist take over.

The dentist stated that he did not want to delegate more tasks to the dental hygienist, and he felt that her scope of practice was sufficiently expanded for the time being. He also did not want to delegate more tasks to the prophylaxis assistants because the dental hygienist would have *nothing to do*. The dental hygienist herself would like to delegate more tasks to the assistants, *but this was never under discussion*. As to the question on which tasks she would like to delegate, she answered:

> Simple calculus or something. Often, they work on the other side of the practice, and I am here alone. Thus, you cannot quickly arrange this. However, if I make fillings, I always have an assistant. That is always the case. Then they come here, or a secretary assistant often helps. This varies depending on who is free at the time.

Currently, the dental hygienist does not know which tasks the assistants perform, but she would like to delegate patients with calculus and no periodontal diseases to the assistants. She does not know if this would be possible, and she never considered this as an option because her patient schedule was not too busy.

3.4.1.3 Interrelationship between dentist and dental hygienist

The dentist typified his relationship with the dental hygienist as an employer-employee relationship and graded their relationship as moderate to good. The dental hygienist thought their relationship was good, but this *was even better when she was working in the other room next to the dentist*. At that time, they had more consultations. They both considered themselves to be open to suggestions and feedback from each other.

3.4.1.4 Perspective on developments in task redistribution

The following passage demonstrates the dentist's personal view on task distribution:

> It has two sides. It is a pity that, as a dentist, I do not do some tasks anymore, otherwise it becomes very busy. The investments are so high. You have to follow a certain direction with your practice. You are not a practice but a company. Many people work here. The investments and debts are also high. At a certain point in time, we have to organize…
>
> If you cannot delegate, you cannot grow. You only have two hands. There is a demand for my work because I get new patients every day… So, yes, you are forced. The circumstances force you to distribute more. Your task as a dentist becomes very small. You cannot permit yourself to remove calculus. You can, but then you have to refuse new patients, and this is never good for a practice. You also get more management tasks, and that is also nice for a dentist. Thus, the effect of task redistribution is twofold.

The dentist also stated that task distribution creates opportunities for dentists to specialize, but this is difficult to organize. The investments are high, and there has to be an optimal schedule to use all equipment and human resources. Related to task redistribution and an optimal schedule, the dentist stated that in the first year after graduation, approximately 10 to 15% of the dental hygienist's work time has to be supervised.

The dental hygienist sees the variety in tasks as the most important aspect of task distribution: *otherwise it would be boring*, she stated.

The dentist's reaction to the Committee for Innovation in Oral Healthcare scenario was that he was *working on it*. He believed that this scenario was achievable and sound, but he stated that it was almost impossible to find a dental hygienist. The shortage of dental hygienists is enormous, and they all want to work two or three days per week. He saw far more opportunities to gain some time through delegation of partial tasks instead of patient delegation. If he could find a dental hygienist capable of performing within this scenario, however, he would consider this. The dental hygienist thought that the committee's scenario was possible, but she was uncertain whether this would change anything in the practice:

> It also depends a bit on me, what I would like. I think this is a great responsibility. I have my doubts about it because the dentist has the final responsibility for the entire treatment, and a dental hygienist is a part of this treatment. The patients are not yours; they belong to the dentist. I find it difficult to picture a dental hygienist indicating and referring back to the dentist. I find it odd.

The ideal scenario for this dentist would be simultaneous task delegation over more dental chairs. He would let the dental hygienist and the prophylaxis assistant take over some parts of the tasks in his treatments. He would perform all dental checkups because he is the one to indicate the care that is needed. To achieve this ideal cooperation, the tasks must be clearly defined together with the time indication. The personnel flow must also be very precisely scheduled. This dentist was gradually adopting the switch system to work on two patients simultaneously, and some progress had been made on this.

The dental hygienist saw the ideal cooperation scenario as her getting clear orders from the dentist and time for immediate consultation. In the future, she would also like to perform dental checkups, but only in patients with stable dental health. She thought that this dentist would agree with this if she indicated a willingness to perform these tasks.

3.4.1.5 Determinants of the dentist's willingness to distribute more tasks

The dentist stated that the three mentioned aspects from the literature are indeed *the basis on which you refer a patient to another professional*. The dental hygienist knew that the dentist thought of her as a good dental hygienist. She also thought that he had confidence and appreciation for her. Further, she stated that she always informed the dentist if she was uncertain in her ability to perform a task.

In his tenure as a dentist, he has worked with three dental hygienists and has had a *slightly positive experience*. In the hypothetical scenario that the dentist would not be able to treat his patients for one day, he would have confidence in his current dental hygienist to take over for him. The dental hygienist thought that the dentist would trust her on this, but she also stated:

> This was never an issue because I do not perform dental checkups. I think that all patient appointments would be rescheduled. I could make some fillings within my scope of practice if there was an assistant. The dentist is not present then… but I like him being present; you have somebody to rely on.

On the question of how the dental hygienist would feel after she treated her dentist's patients, she stated:

> I am not going to lose any sleep over it, but I would think, "o gee," maybe I get negative reaction on some treatments if he sees this afterwards.

3.4.1.6 Dependent variables

At T1, this dental hygienist had the highest score for intrinsic job satisfaction. She was selected because of her medium care and cure level of task distribution, high

autonomy, high job satisfaction and relatively low GNS. At T2, this dental hygienist was still working in the same practice and scored a bit lower on the overall job complexity and intrinsic job satisfaction, but she scored higher on extrinsic job satisfaction. The dentist in this practice had the lowest intrinsic satisfaction of all six dentists in our study, but he was satisfied with his income and career. Of prophylaxis assistants of all practices in our study, the prophylaxis assistants in this practice were the most satisfied with their careers, the least satisfied with their jobs and some less satisfied with their income.

The patients of this practice scored relatively low on all three aspects of the DVSS: information-communication, understanding-acceptance and technical competence. Only patients in the Germany practice scored lower than patients of this practice. Patient comments, however, did not provide any particular reasons for these low scores. The only comment that was made was regarding private conversations between the dentist and the assistants; three patients reported this.

In conclusion, the dental hygienist is the only one highly satisfied with her job in this practice. The dentist and the prophylaxis assistants scored remarkably lower. The patients were also far less satisfied compared with the other five practices.

The following aspects could explain the task distribution in this practice (Figure 8):

- The very easygoing relationship and communication between the dentist and the dental hygienist, partly due to the somewhat *modest* dental hygienist;
- The dentist was searching for a dental hygienist for almost 18 months before he found this dental hygienist. He is satisfied that he has a dental hygienist working in his practice, and he is willing to keep her satisfied and consults her about her wishes in her job;
- This dentist is aware that he must distribute his tasks to free his own schedule and develop his practice, and he is willing to supervise this dental hygienist in performing expanded tasks;
- The dentist's high level of trust in the dental hygienist's competence and her responsibility.

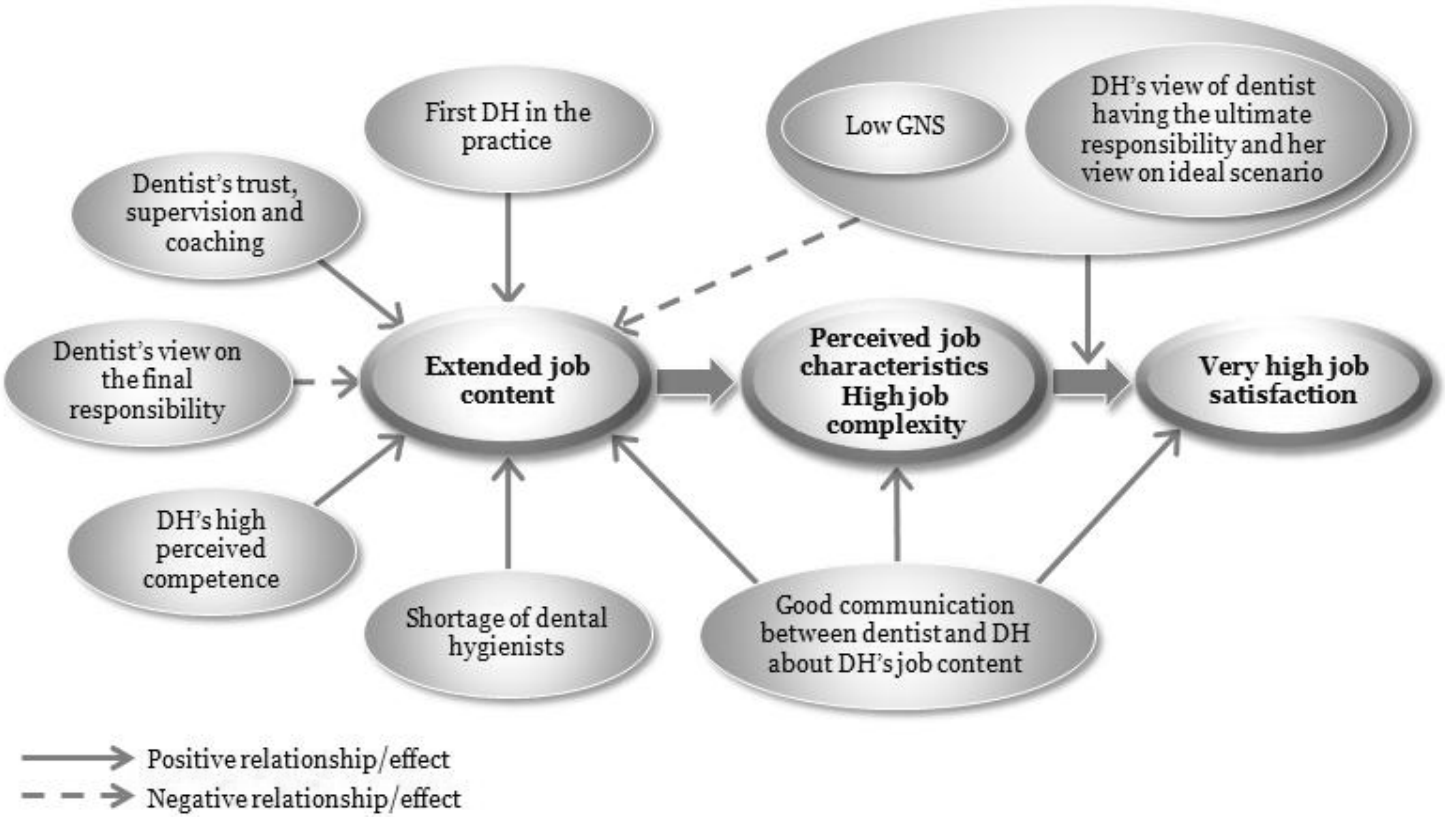


Figure 8. Important aspects explaining the dental hygienist's job content, perceived job characteristics and job satisfaction in Iceland case

3.4.2 Poland case

3.4.2.1 Setting

This practice, which had 14 personnel and five dentist chairs, is situated in a suburb of a medium-to-large-sized city. Three dentists work here: one dentist-implantologist, the dentist-owner (an orthodontist who also specializes in periodontology) and a general dentist. There are approximately 4,000 patients, including those who receive complete oral healthcare in this practice and those referred from other dental practices, especially for periodontal treatments. There are approximately 15 dentists in the region who refer their patients to this practice for periodontal treatments. This is a kind of family business. Indeed, the dentist's wife makes the work schedule, and his daughter makes brochures and does the advertising. The ratio between the dentists and other occupations involved in the patient care, such as dental hygienists, prophylaxis assistants and dental assistants, is 1:2.9.

The dentist-owner (male) has 31 years of experience, and he has worked in this practice during the entire period. He studied orthodontics in Germany, but he specialized in periodontology by developing his own chemical products against periodontal diseases (dentifrices, gels and mouth rinses). He works 16 h per week in patient care, and he spends 50 more hours on product development activities. His motivation is to treat periodontal diseases chemically instead of surgically.

The dental hygienist is a 25-year-old woman who has worked two days a week in this practice for two years and works three more days in another general dental practice.

With regard to the work pressure in this practice, it was possible to make an appointment with the dentist and the dental hygienist within one month. The dentist stated that the work pressure was being evaluated (he regularly asks employees if they are too busy). If the work pressure was too high, he would hire more personnel. In the near future, the dentist will expand this practice by two dentist chairs and possibly more personnel. He expects more new patients as the result of the spreading reputation of his products.

The dentist estimated that the total time spent on prevention in this practice was 10%. He also stated that preventive treatments are a type of service, and patients do not have to pay for preventive treatments. Therefore, it was not possible to trace exactly how much time was spent on prevention.

3.4.2.2 Current task division

The dental hygienist treats patients with periodontal diseases, places sealants, takes x-rays (always in consultation with the dentist) and occasionally makes a filling and performs a dental checkup. The dentist decides on the treatment plan for patients with periodontal diseases, and the dental hygienist performs the initial

periodontal treatments. After the measurements at the re-assessment (performed by the dental hygienist), the patients visit this dentist again. The dental hygienist stated:

> The dentist has complete authority; we follow the treatment plan as he says. Thus, we do not really have any other choice in the matter.

According to the dentist, there were two reasons for this task division. The first reason was financial. He was very much aware of the high costs of periodontal care, and he sometimes did not charge all treatments. He made prior agreements with patients about the costs. The second reason was the control of his product efficacy. Therefore, the dentist made decisions about the treatments, and he wanted to see patients after the re-assessment. He was aware that the dental hygienist did not like this task division; however, this was also related to financial considerations and his research, and the dentist stated that the other employees accepted this.

The dentist was extremely satisfied with the dental hygienist's work in periodontology, and he would like her to concentrate in this field. He stated:

> She makes nice fillings, but I have dentists to do these. These superficial fillings are not as important as a cleaning of a 9-mm pocket. This is the policy of this practice, and she does not like it, I know that. She would like to perform more fillings.

The dental hygienist would like to specialize in oral healthcare for children. She already indicated this, but there was too much periodontology work. With the arrival of a new dental hygienist, this dental hygienist hoped for a chance to do other tasks aside from periodontal treatments. She would like to make more fillings, but the dentists' schedules must be full before fillings are delegated to the dental hygienist.

The prophylaxis assistants treat patients with periodontal diseases, focusing on the recall phase and sometimes the initial treatment of less complex periodontal disease. They remove calculus, give instructions in oral care, place sealants and place orthodontic brackets. Patients with a stable periodontal situation are referred to the assistants for recall treatments. Due to the shortage of dental hygienists, one prophylaxis assistant with 10 years of treatment experience also performed initial periodontal treatments. The scope of practice of each worker is in consultation with the owner. The dentist stated:

> Each worker may indicate what they do and do not want to do. If they find some tasks difficult or they do not want to perform certain tasks, then they do not have to perform those tasks… otherwise, you get bad quality. I suppose

that if somebody does not want some tasks, they think they cannot do it. Then the only thing I can say is that I want to stimulate you to do this, I want to help you, or I must say no, I will not do it. This is how I handle these matters.

All patients initially visit the dentist and are then referred to the dental hygienist or prophylaxis assistant. The appointments are made at the reception desk, and the staff is not very familiar with the differences between the occupations dental hygiene and prophylaxis assistant. The dental hygienist mentioned that the staff sometimes misinforms the patient. In addition, some dentists refer patients to the wrong occupation. They, too, are not familiar with the difference between the occupations, and they do not always make a screening in accordance with the DPSI (Dutch Periodontal Screening Index).

The patient dossier is central to the communication about a patient's treatments and an evaluation at their re-assessment. Indeed, there is no other oral structural consultation about a patient's treatment. Every six weeks, however, there is a structural consultation in the form of a dinner to evaluate the practice organization and the mutual relationships. The agreements are noted in the short minutes. The dentist feels that there is adequate time for his employees to participate in the practice organization. The dentist stated that he does not enforce things and listens to the signs from his employees, but he is also the one who makes all of the decisions.

The dentist sees all patients with periodontal diseases at the end of their treatment, which is a type of supervision for the dental hygienist's work. In addition, he sometimes supervises young dental hygienists in their periodontal treatments. The patients with mild periodontal diseases are referred to less experienced dental hygienists, and severe cases are referred to dental hygienists with more experience. The dentist also does research on the quality delivered by dental hygienists by comparing the results of their periodontal treatments. The dentist is convinced that the dental hygienist would consult him when she is uncertain of her treatment, which happens regularly. The dental hygienist also stated that when no dentist is present, she consults another dental hygienist or prophylaxis assistant colleague with more experience. Regarding restoration work, the dental hygienist sees that the dentist inspects each preparation and each restoration that she makes.

The dentist feels responsible for all of the patients in his practice, which means that he works with patients to potentially develop financial solutions in cases of mistakes. The dental hygienist also feels responsible for the treatments she performs.

3.4.2.3 Interpersonal relationship between the dentist and dental hygienist

The dentist is extremely satisfied with this dental hygienist; he calls her conscientious and mentions her fine manual skills. He thinks that she knows that

he is satisfied with her and the quality of her work, but he *never told her about this*. The dentist typifies his relationship with the dental hygienist as friendly, which is the kind of relationship he has with all of his employees. He calls her by her first name, but she insists on calling him Sir because all other employees in the practice do so. She sees their relationship as collegial and typifies the relationship as good.

3.4.2.4 Perspective on developments in task distribution

The dentist thinks positively of task distribution, and the only negative aspect is that the dentist sometimes has to solve situations that are beyond the dental hygienist's scope of practice. This has happened a few times, and he felt responsible for not making the right judgment in referring these tasks to the dental hygienist. The dental hygienist is positive about task distribution, which, according to her, offers chances for decreasing the dentists' work pressure and increasing her task variety; however, she underscores the importance of the quality of the fillings, and she was not sure that dental hygienists could make the same quality fillings as dentists.

The dentist feels that a dental hygienist with a Bachelor of Health needs approximately two to three hours of supervision per week. He supervised his dental hygienist while she was making fillings because some mistakes were made, such as preparations that were too large and the loss of a lot of dental tissue.

The dentist thinks that the existence of dental hygiene practices in the Netherlands is a negative development (i.e., the quality of periodontology work in these practices is low). The dentist believes that these dental hygienists are not critical enough, and they prefer not to refer patients to the practice specialized in periodontal care because of income loss:

> And they are going to drill also, those independent dental hygienists! That is impossible. I think the quality…it is completely…the quality is lost.

Furthermore, the dentist sees the scenario of the Committee for Innovation in Oral Healthcare as impossible, and he prefers one central person with a high level of theoretical knowledge making the diagnoses and referring patients to other professionals. All patients would then come to this *diagnosis doctor* every 18 months for a checkup. The work of this diagnosis doctor used to be his dream scenario.

Concerning the Committee for Innovation in Oral Healthcare scenario, the dental hygienist stated:

> I think this goes too far. There has to be something left for the more highly educated professional. My opinion is……I think we cannot take everything

> over from the dentist. I think I would not even want this; I think this is not applicable here. I think you get too much of the responsibility then.

Ideally, she would have ample consultation time with the dentist, fully participate in treatment planning and decide together which tasks should be performed by which occupation, including tasks such as fillings and dental checkups. To achieve this ideal scenario, she thinks more structural consultations and patient discussions are required. Furthermore, dentists must have more confidence in dental hygienists to delegate more tasks.

The dentist thinks that only a little time would be spared by delegating fillings to the dental hygienist. In addition, the dentist believes that the easiest way to get something done is to do it yourself and only delegate to dental hygienist in cases of four or five cavities. The most efficient use of time would be to delegate the initial periodontal treatments, which currently occurs. The dental hygienist expects task distribution to influence the dentists' work pressure. The dentist would have more time for other things, and the dental hygienist would have a more complex scope of practice.

3.4.2.5 Determinants of the dentist's willingness to distribute more tasks

The dentist has confidence in people working in his practice, and he knows that they are honest:

> Yes, I have to have confidence in the dental hygienist; otherwise, delegation of tasks would not be working.

The dental hygienist is convinced that all three aspects (trust, confidence and supposed competence) are positive in this practice.

The dentist did not want to delegate more tasks to the dental hygienists, but he stated that he would delegate more tasks to the prophylaxis assistants, but only due to the shortage of dental hygienists. He stated that it was also difficult to find dental assistants:

> Everybody wants to become a dental hygienist or a prophylaxis assistant. They work a few years as a dental assistant, and if you do not offer them the possibility to develop, they leave. It is hard to find the lowest level of occupations because people do not want that anymore; they want to grow.

In the hypothetical scenario in which the dentist is not able to treat his patients, he would not let the dental hygienist take over because of her lack of experience. If she had 10 years of experience, he would agree. He also inspects the treatments of some young dentists, so his reluctance is not related to the kind of occupation. Interestingly, the dental hygienist thought that the dentist would have confidence

in her to take over his patients; however, she only referred to patients with periodontal diseases. The dentist sees himself as very open to the dental hygienist's suggestions; however, the dental hygienist stated:

> Yes. He likes me to be involved, participating and applying new knowledge but ..., yes, he just wants to do his own thing.

The dentist describes his experience in cooperation with the dental hygienist as excellent, especially because they can learn from one another.

3.4.2.6 Dependent variables

This dental hygienist was selected because of her *middle care and cure* scope of practice, middle intrinsic job satisfaction, low autonomy and low GNS in a middle-to-large-sized practice at T1. Compared with the other dental hygienists in our study, she was satisfied with her income, but not satisfied with her career. At T2, the dental hygienist performed more tasks in scientific research and in oral healthcare policy. Her intrinsic job satisfaction slightly increased, but there was no change in her extrinsic job satisfaction or career satisfaction. Interestingly, the dentist in this practice was extremely satisfied with his job, income and career. The prophylaxis assistants graded their jobs, income and career somewhere in between the scores of prophylaxis assistants in our other five cases.

The patients in this practice were also satisfied with the received care (mean 8.1) and personal communication (mean 8.0). Based on these grades and on the DVSS scores, only the patients from two other practices were more satisfied than the patients from this practice. A few patients made comments about the high turnover in personnel, especially dentists. They preferred the same dentist, and one patient even thought that these changes in personnel negatively influenced his dental health. Another patient was devoted to his dentist (i.e., the owner):

> Because dentist X no longer treats patients, I think everything got worse. There are a lot of new professionals. It seems that a new x-ray has to be made at each visit. This was not the case with dentist X; I was extremely satisfied with him. Additionally, I am referred to the dental hygienist at each visit, and when I get there, she tells me that the referral is not necessary. It is a pity that dentist X does not treat patients anymore. I find him super! I have my doubts about other dentists.

In conclusion, the dentist was the most satisfied with his job in this practice, and the dental hygienist and prophylaxis assistants were reasonably satisfied. The dental hygienist would like to have a more expanded scope of practice, but she is aware of the context in which she is working in relation to the dentist's specialization and his product development.

The following aspects could explain the current task distribution in this practice (Figure 9):

- The dentist's specialization in periodontal treatments makes it almost impossible for dental hygienists to perform any other tasks aside from periodontal care. The dental hygienist is fully aware of this but stays in this practice because she has colleagues with whom she can discuss patients. At her other job, she has a more extended scope of practice but no dental hygienist colleagues;
- The dentist's great satisfaction regarding the dental hygienist's performance in periodontal care results in his desire for her to spend her time performing periodontal tasks, but he is aware of the dental hygienist's wish for extended caries tasks. Therefore, he does delegate some fillings to her and even supervises her during these tasks. He is convinced that this is the best way to keep her satisfied. He certainly would not want her to leave the practice because he is very satisfied with her work;
- Because there are multiple dentists, there are less extended tasks to be distributed to dental hygienists. If there is enough time available in dentists' schedules, no tasks are allocated to other occupations.

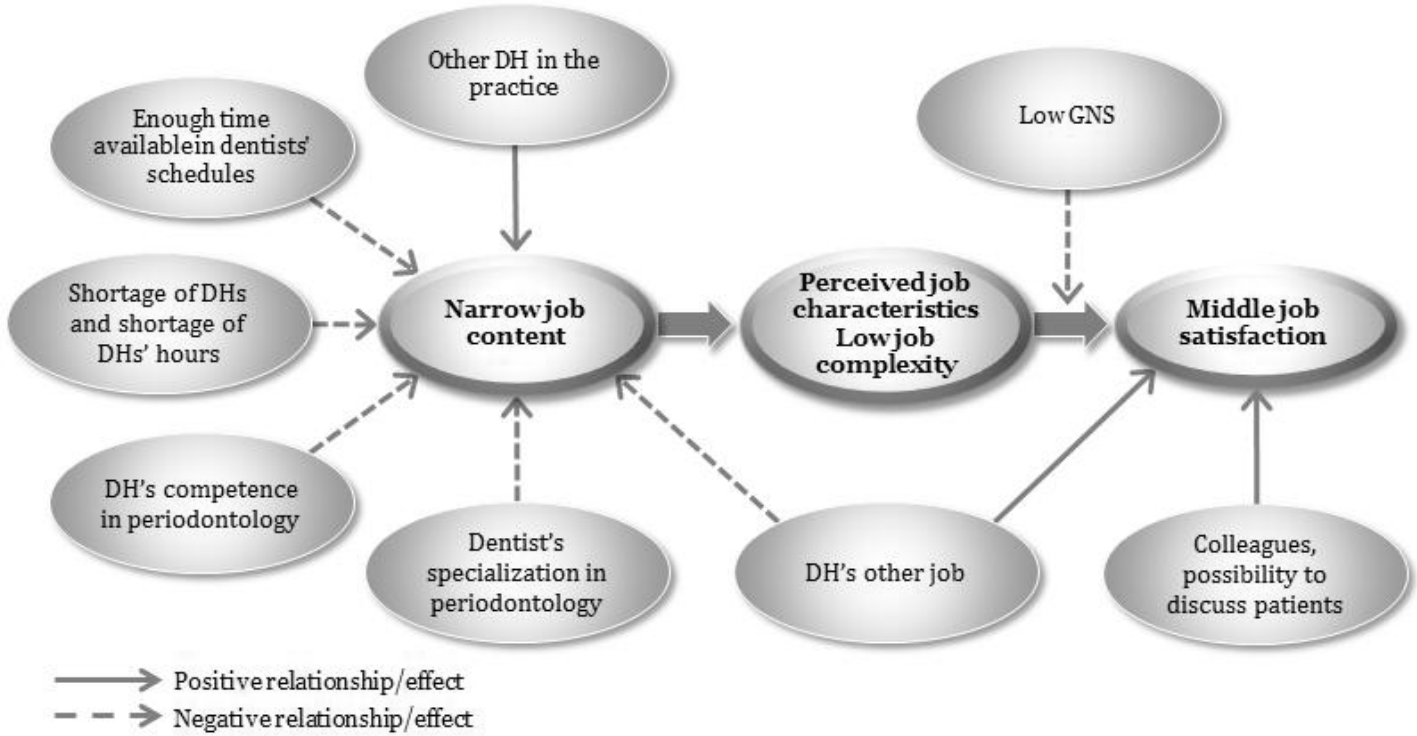


Figure 9. Important aspects explaining the dental hygienist's job content, perceived job characteristics and job satisfaction in Poland case

3.4.3 Germany case

3.4.3.1 Setting

This practice, which had 15 personnel and three dentist chairs, is situated in a suburb of a middle-to-large-sized city. Approximately 4,000 patients visit the practice regularly, but the practice also has many other patients who do not visit as regularly. Of the four dentists working there, three are from Germany. Until recently, there was an orthodontist and a periodontist working there. The ratio between dentists and other professionals involved in patient care (i.e., dental hygienist, prophylaxis assistants and dental assistants) is 1:1.

The dentist/owner (male) has 28 years of experience as a dentist and is the owner of two practices in two different cities. He took a master's class for organization in dental practice. During his career, he has owned six dental practices and worked in Germany for many years. He works 32 h per week in patient care, and approximately 20 h is reserved for organization, courses and travel time.

The dental hygienist (male) is 31 and has worked at both practices owned by this dentist since his graduation (two year ago). In addition, he also works in another general dental practice. In this practice, he is the only dental hygienist, and he works eight hours per week. He has seven years of experience as a dental technician, and he studied dental hygiene because he wanted to broaden his professional knowledge. The interview took place at location A, but at T1, the dental hygienist filled out the questionnaire for location B. The selection for location A as a case was made because this was the practice where the dentist-owner worked.

Most patients are seen and treated by dentists only. Occasionally, the prophylaxis assistants also treat patients, but their activities are mostly oriented around the patient's visit to the dentist. Sometimes, they have separate appointments with the patients. The dentist-owner occasionally works simultaneously with two patients.

It was possible to make an appointment with the dentist within one month, but the dental hygienist' schedule did not leave much space for appointments, even within two months.

The owner was actively seeking to expand the practice by adding more dentist chairs and personnel, but he was limited by the small space in the current building. He did not want to move his practice outside the neighborhood because he felt that such a healthcare facility was highly needed in the area, which consists of many immigrants. He hoped to organize the practice in such a manner that each patient was referred to a specific dentist according to the care needed, which would maintain a kind of specialization among the professionals.

Approximately 20 to 25% of all treatment time was spent on prevention, and the dentist reported that even more time for prevention was needed because of the large number of immigrant patients with poor oral health.

3.4.3.2 Current task division

The prophylaxis assistant gives instruction in oral hygiene, removes calculus, places sealants, and takes dental impressions and x-rays. The dental hygienist described his current scope of practice with the following statement:

> In this practice, I work as an o*ld style* dental hygienist.

He treats patients with periodontal diseases (complete periodontal care for patients is delegated to him), sometimes he places sealants, but he seldom makes a restoration or performs a dental checkup. At location B, he has more variety in his scope of practice, and at his other job with another employer, he has the most expanded scope of practice, including some tasks as a dental technician. The dental hygienist feels that he is specialized in periodontology, and he thinks of himself as being quite competent in caries diagnosis and treatment. He wishes to specialize even more in cariology. When asked if there were any possibilities for him to specialize in this practice he answered:

> No, certainly not in this practice! Because I work according to the old manner of dental hygiene and there are four dentists who can perform the advanced tasks faster than the dental hygienists, I only get to work in periodontology and dental hygiene.

This dental hygienist was absolutely willing to take over additional tasks from the dentist.

> That is the reason that I studied in the first place, to get more variety. The more variety, the more I like the profession. So, if you give so much work to the prophylaxis assistant, then I just get periodontal cases, and I do not like that. I like the variety!

The dentist thought that the dental hygienist would like to specialize in dental prosthetics. He would support him in this, but he needs the dental hygienist for the periodontology work. He would like this dental hygienist to work full time for him because there is enough work. At the moment, he is *too valuable* to place sealants and remove calculus; his time is limited:

> He is too highly educated and too specialized to perform these tasks.

There is ample time for the dental hygienist to consult the dentist about patient treatments, and this happens regularly. If the dentist is not present, they have phone consultations.

The dentist wished for more patient referrals to each other in this practice, including among the dentists. The dental hygienist stated that the German dentists have less knowledge on prevention and periodontology; therefore, the referral of patients to him and the prophylaxis assistants is not always based on actual patient needs. After consulting with the owner, the dental hygienist made an important task for himself to make policy to improve patient selection in this referral process. Furthermore, in this practice, there are many patients who do not speak Dutch and patients who do not know the difference between the dentist, dental hygienist and prophylaxis assistant, which makes the referral process even more difficult.

There is no structural communication about the patients, and the dentist would like more structure in this. He checks all patients' bills made by other professionals, and sometimes he adjusts them. He also always checks the x-rays of all patients and the decisions made by other professionals based on these images. If he disagrees, he discusses the case with the employee.

Until recently, there were no structural meetings in the practice. According to the dentist, they had one just a few weeks ago (with all of the employees) where they discussed the practice organization, holidays and hygiene. The dental hygienist, however, did not mention any recent consultations:

> This practice is known for insufficient communication. There is insufficient communication about the patients and among us; each dentist works on his/her own island.

The dentist feels responsible for his patients, but he has confidence in the dental hygienist and is willing to delegate many tasks. The dentist was absolutely sure that the dental hygienist would consult him if he was uncertain in his treatment. The dentist's final responsibility toward patients is seen in the structural consultation between him and the dental hygienist in cases of important decisions in patient treatments. The dental hygienist feels fully responsible for the patients' periodontal treatment.

3.4.3.3 Interpersonal relationship between the dentist and dental hygienist

Both the dentist and the dental hygienist typified their relationship as colleagues and thought of themselves as open for suggestions and feedback. According to the dental hygienist, the dentist always takes his suggestions into consideration, but he could be *even more open*.

3.4.3.4 Perspective on developments in task distribution

This dentist believed that the process of task distribution occurred too slowly. In his opinion, one needs more varied specialties in the same practice to offer the best care. Dentistry is too complex for solitary practices. He refers to large clinics with one central figure for the management and organization and more varied specialties. Dental hygienists and prophylaxis assistants are two of these specialties in his scenario. Furthermore, he stated that the dentists are individualists, and their skills for cooperation and teamwork are not developed enough during their studies.

The dental hygienist sees task distribution as an opportunity for him to broaden and deepen his profession; however he refers to communication and control of the quality of care as absolute preconditions. Moreover, he would like to make dental hygienists responsible for their own work.

The dentist *absolutely disagreed* with the scenario of the Committee for Innovation in Oral Healthcare. In his ideal scenario, the dental hygienist takes a place in the second line of oral healthcare as a kind of specialist in periodontology. He refers to the extension of dental hygienists tasks as *absurd* and strongly suggested shorter education for dentists. In his opinion, dentists are currently over-qualified because most of them only perform routine tasks. Conversely, the dental hygienist believed that the scenario of the Committee for Innovation in Oral Healthcare was absolutely possible. Therefore, an attitude change among old-fashioned dentists and dentistry education is needed. The dental hygienist, however, did not think that all dental hygienists have the skills and knowledge to perform within this scenario. An individual assessment to decide whether a dental hygienist is able to perform within the Committee for Innovation in Oral Healthcare scenario is also needed. According to the dental hygienist, there are many people with a Bachelor degree who actually do not deserve to call themselves a dental hygienist. He is seriously concerned about the quality of oral healthcare. Concerning the question about whether the scenario of the Committee for Innovation in Oral Healthcare could mean something for this practice, the dental hygienist stated:

> Nothing is going to change here! Certainly not in this practice!

According to the dental hygienist, the ideal cooperation between a dental hygienist and a dentist has already been achieved in his work with the other employer. There is a one-to-one relationship (one dentist and one dental hygienist), and they divide the patient care responsibilities. The dental checkups are performed by both professionals by taking turns, and the dental hygienist performs all tasks from the extended scope of practice. The dental hygienist finds it irresponsible for only dentists to perform dental checkups because many dentists pay little or no attention to periodontal screening and oral hygiene. In his view, there is generally little teamwork in dentistry. The dentists see dental hygienists as their helpers, and

they are not willing to share knowledge and are not familiar with the dental hygienist's scope of practice. The most important aspect is a mutual relationship. The dental hygienist believed that there had to be no difference in the level or the esteem between the professions, and everybody has to speak freely about their vision of oral healthcare.

According to the dental hygienist, his work pressure would be higher as a consequence of more task distribution, whereas the dentists' work pressure would be lower. However, the dentist stated that his work pressure could be influenced in both ways because routine tasks were delegated, but the complexity in oral healthcare is growing and requires more specialization.

3.4.3.5 Determinants of the dentist's willingness to distribute more tasks

The dentist was willing to delegate dental checkups and caries restoration to the dental hygienist, but he was not enthusiastic about this:

> Yes, I have my opinion on this, and here I differ from my dental hygienist. This is a silly extension. This is my personal opinion, and that is the way we practice here. Now and then, I let him make some fillings, but it is more based on 'you have learned this and you like doing it', not because I think that this is a meaningful extension. I prefer that he does more periodontology work.

Related to the supposed competence, the dentist stated that there were times when he was not satisfied with the fillings made by the dental hygienist. Although the dentist clearly conveyed that he had confidence in the dental hygienist, the dental hygienist stated that confidence was not the most important aspect of the dentist's willingness for task distribution. The dental hygienist believed that perceived competence and appreciation were far more important.

The dentist did not believe that all dental hygienists are competent enough to perform the new extended tasks. For example, dental hygienists have to learn what to do if they expose the root canal, and they do not learn this in their studies. In addition, the dentist believes that there is no need for an additional professional to treat caries, but there is a greater need for professionals in periodontology. This is also related to the greater number of elderly patients with their own teeth. He would delegate more tasks to the assistants, but he is not satisfied with the Dutch education system for dental assistants. Indeed, the dentist stated that dental assistants have little experience, and the fact that education is not necessary to perform dental assistants' work does not make it easier.

When the dentist was asked if he would feel comfortable with the dental hygienist taking over in a hypothetical scenario where the dentist was not able to treat his patients, he answered that this scenario occurred once. The dental hygienist did the checkups and some fillings, but the dentist reiterated that he was against this

extension of the dental hygienist's scope of practice. The dental hygienist simply did not know if the dentist would trust him to take over his patients.

The dentist preferred task delegation, but his solution would be a simpler and shorter education for dentists, with possibilities for additional specialization. Only then can you prevent highly educated people from performing relatively simple work. He stated that we should not change the dental hygienists' scope of practice in another direction because the current work in periodontology is highly needed.

This dentist has worked with dental hygienists since the early 1980s. He stated that he was one of the first dentists to have a full-time dental hygienist in a team of two dentists. His dental hygienist also performed dental checkups, which was controversial at that time. He even had a conflict with the insurance company, which did not want to compensate for the dental checkups performed by a dental hygienist. His rule was that every third checkup of a patient was performed by a dentist. His experiences in the past were purely positive, but due to the current shortage of dental hygienists, it is difficult to find a one:

> They have a somewhat exaggerated view on remuneration, or they only want to work as self-employees in dental hygiene practices.

However, he also stated:

> I would not want to work without a dental hygienist, especially in this practice setting. Here, everything works around the dental hygiene framework. I mean, for me, this is the basis of dentistry.

3.4.3.6 Dependent variables

The selection for this participant was based on his high level of task distribution, low perceived job satisfaction and high GNS score at location B. At T2, he filled out the questionnaire for the practice at location A, the same practice where the interview took place and where the dentist-owner works. In this practice (at T2), the dental hygienist experienced even less autonomy and was less satisfied with his job, income and career. Approximately two months after T2, this dental hygienist left this employer and started his own dental hygiene practice within the practice of his other employer.

Moreover, the dentist in this practice was also less satisfied with his job, income and career compared with the dentists from other cases. The prophylaxis assistant was satisfied with her job, but she scored very low on extrinsic job satisfaction and career satisfaction.

Patients of this practice were the least satisfied compared with the patients from the other five practices in our study. The grade for received care was 7.3, and the

grade for personal communication was 7.0. Most comments were made about the dentists not speaking Dutch and high turnover:

> In this practice, you see always foreign dentists, and there is regularly a new dentist. Bonding with the dentist is not possible because the next time you are there it is somebody else who often does not even speak Dutch.

Overall, the personnel of this practice were less satisfied than the personnel of our other practices. The patients were also unsatisfied with the care received and the communication. The dentist-owner himself knew that improvement was needed in communication and practice organization. His initiatives to change this were too late for the dental hygienist, and he left the practice. Moreover, the dentist and dental hygienist did not share the same vision on task distribution, which led to the dental hygienist being dissatisfied with the scope of his practice.

The aspects that could explain the current task distribution in this practice include the following (Figure 10):

- The dental hygienist's low working hours in this practice (i.e., there was far more periodontal care needed in this practice than the dental hygienist could provide), and there was no option to expand the dental hygienist's scope of practice;
- A lack of work organization and clear policy in the practice. Although the dentist had an opinion of the care policy and organization of the practice, this was not visible in the current situation, which was due to the high turnover, lack of communication between professionals and many foreign dentists with different views on oral healthcare, especially on dental hygiene;
- Dentist's strong opinion that dental hygienists should concentrate even more on periodontal care rather than expand their scope of practice.

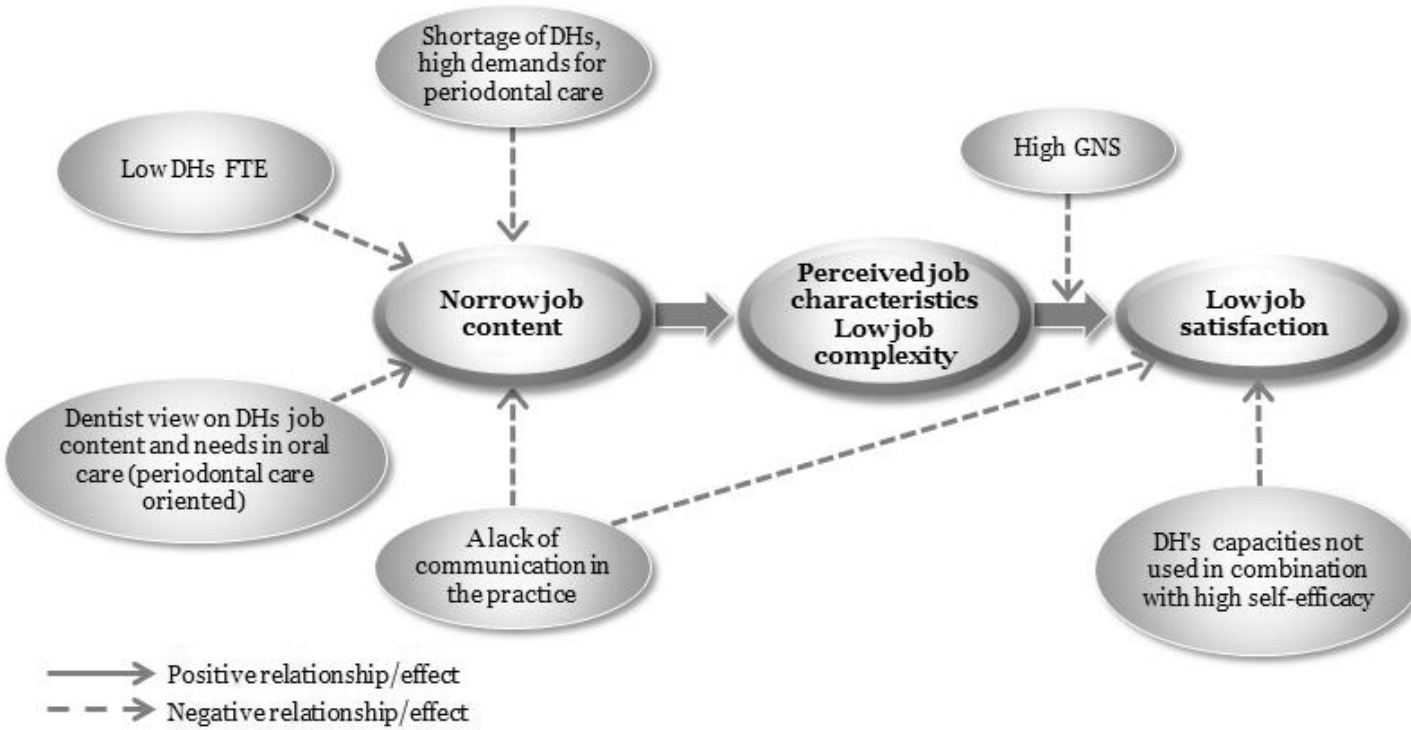


Figure 10. Important aspects explaining the dental hygienist's job content, perceived job characteristics and job satisfaction in Germany case

3.4.4 United States of America case

3.4.4.1 Setting

This practice, which had approximately 35 personnel and 10 dentist chairs, is owned by two dentists and situated in a suburb of a small city. There are approximately 8,500 patients, and 7,300 visited the practice last year. The following professionals work in this practice: dentists, dental assistants, prophylaxis assistants, dental hygienist, office managers, manager assistants and support staff. One of the dentist-owners participated in the interview. The ratio between the dentists and other professionals involved in patient care (i.e., dental hygienist, prophylaxis assistants and dental assistants) was 1:3.2.

This dentist (male) has worked in this practice for five years, spending 36 h per week in patient care and 20 to 22 h as an owner/manager. The other participant was the 20-year-old dental hygienist (male) who has been the only dental hygienist in this practice since his graduation two years ago. He works 26 h per week and also works in a dental hygiene practice.

All dentists in this practice work with the so-called 'switch system'. One dentist works simultaneously with two or three patients who are also treated by assistants. The actual work pressure is reasonable, and it was possible to make an appointment with the dentist or dental hygienist within one month.

In the last two years, the practice expanded from seven to ten dentist chairs, and new technological devices for patient treatments were purchased. The owners were thinking of purchasing more new technology, but their plans were more directed to expansion at new locations because they recently opened a second dental practice at another location.

According to the dentist, approximately 10% of all treatment time includes prevention treatments (i.e., dental hygiene control, instruction, education and dental cleaning). He is satisfied with this percentage because he sees that there is more prevention in his practice compared with other dental practices in the neighborhood; however, he would like for his employees to be on the same page about their view of patient care:

> Eh…yes, a boss always wants his ideas, which are the basis of the practice, to be passed on to the other staff members. That does not always succeed, however, because everybody is naturally stubborn and a know-it-all. That is not bad, I mean the variety must also exist, but…(shrug).

3.4.4.2 Current task division

Each patient is first seen by an assistant who prepares the patient, performs dental cleaning (standard for each visit), takes x-rays (standard every two years) and indicates the patient's complaints and needs. The dentists detect and diagnose diseases and always check all treatments afterward. The policy is that no patient may leave the practice without a final dentist's check. This does not apply to patients with periodontal diseases who are at the office to visit a dental hygienist. The owners have the policy to educate the assistants themselves, and they make a distinction between prevention/prophylaxis assistants and senior assistants. The prophylaxis assistants give instructions and education in oral health, remove calculus, take x-rays and take dental impressions. In addition to these tasks, the senior assistants also administer local anesthesia, place composite fillings, temporary bridges and crowns and sometimes perform scaling and root planning.

The task delegation to the dental hygienist is on the level of the specific care area needed. In this practice, complete care for patients with periodontal diseases was shifted to the dental hygienist. Everything from intakes, initial treatments, recall and follow-up is in the scope of the dental hygienist's practice. Sometimes, the dental hygienist is also assigned in the switch system, in which case he makes composite fillings, takes dental impressions, and takes x-rays and sealants. He does not perform dental checkups (this division was made deliberately). Dental checkups are left to the dentists. In addition, the dental hygienist no longer performs cavity preparations. The dentist is generally open to the delegation of cavity preparations and restoration but finds this dental hygienist too slow for these tasks. He finds the quality of the dental hygienist's restorative work good, but the speed is slow. The dental hygienist stated that this change in his scope of practice was good for him too because he could not keep up with the high tempo of these treatments. Furthermore, the dental hygienist feels that there is currently no distinction between dental hygienists and assistants. They both take part in the dentists' switch system, and the dental hygienist performs the same activities as the assistant. The dental hygienist wanted to specialize in periodontology because this gave him more satisfaction and he felt more competent in this part of the job. The dentist offered to allow the dental hygienist to specialize in periodontal surgery, but the dental hygienist was still thinking about it.

There is only structural consultation between the dentist and the dental hygienist in exceptional patient cases. In a doubtful case, there is no time for the dental hygienist to immediately consult a dentist, and the dentist does not want the dental hygienist consulting him each time he is uncertain about his treatment. In an urgent case, a patient can schedule an additional appointment with the dentist. This dentist is willing to spend approximately half an hour per week on supervision and feedback for the dental hygienist. There is no supervision on the dental hygienist's work in the field of periodontology. The dentist stated:

> In that, we let him more or less be free.

The dentist also stated that the work that the dental hygienist was currently performing could be performed completely independent from the dentist. This was in contrast to the dental hygienist's work within the switch system, which was always inspected by the dentists.

The dentist felt a responsibility toward patients to refer them to competent employees, but he did not feel ultimate responsibility.

> Within their range of competence, all employees here are responsible for the things they do.

There is a once-a-week consultation with the dentists only, where the technical parts of treatments are discussed. The communication with patients and the view on healthcare is also discussed at these meetings. Approximately three times a year, there is a consultation with all employees, where topics such as internal communication, internal conflicts and financial issues are discussed. One of the owners is the chairman, and short minutes of all decisions are made. Both dentists/owners have the last word in all decisions. The dentist is open for suggestions and feedback, but in the case that the proposed changes/ideas would have profit consequences, he would balance the pros and cons.

3.4.4.3 Interpersonal relationship between the dentist and dental hygienist

The work relationship between the dentist and the dental hygienist was typified as good by both professionals. Their relationship was that of an employer and employee, but they knew each other privately. The dental hygienist felt that they had a friendly relationship outside of the practice, but they had almost no contact with each other in the practice.

3.4.4.4 Perspective on developments in task redistribution

The dentist would like the process of task distribution in oral healthcare to proceed faster, but there are not enough dental hygienists with Bachelor of Health degree. He feels that they have to educate their own people to answer the healthcare demands. The dental hygienist misses the fixed rules for task distribution in terms of protocols and guidelines.

The dentist sees the scenario of the Committee for Innovation in Oral Healthcare as *very nice…good of course*. He also implied that a patient's perception has to change for some preconditions because patients are used to going to the dentist. He sees the scenario of the Committee for Innovation in Oral Healthcare as being possible in his practice, but not until 2018. When asked about this scenario, the dental hygienist replied:

> That would turn out completely wrong.

He feels that the newly graduated dental hygienists Bachelor of Health lack competence to perform oral care well. Although the tasks in caries treatment are a small part of the curriculum, this dental hygienist reported that many dental hygienists experience this part of the job as more important and more valuable. The dental hygienist saw the chances for task distribution to be limited in the sense that most dentists want to perform caries treatments themselves due to greater profits compared with the profits from periodontal treatments. His ideal cooperation with the dentist would be that the dentist indicate, diagnose and refer patients to the specialists, and he views the dental hygienist profession as one kind of specialist. He would leave the prophylaxis assistant outside his ideal picture because of a greater chance for miscommunication between the three different occupations involved. For the dentist, the ideal cooperation was already present in the current task distribution. In the future, the dental hygienist would work with two patients at the same time, and the dentist would be accessible to solve the complications in patient treatments.

3.4.4.5 Determinants of the dentist's willingness to distribute more tasks

Although the dentist has confidence in the supposed competence of his employees, he does not see appreciation for the dental hygienist as a clear aspect for task delegation (i.e., confidence in general is very important). For example, if the dentist did not have any confidence in an employee, the employee would be dismissed. The dental hygienist underscored that a dental hygienists' diploma is not evidence for supposed competence, and the aspects of confidence and appreciation must play a role in task distribution.

When the dentist was asked if he would have confidence in the dental hygienist to take over for him in a hypothetical scenario where the dentist was not able to treat his patients, he answered:

> I have confidence in this, but I am not going to do this because I clearly communicated to the patients that they would always be seen by a dentist. Thus, I have confidence, and it would probably be good, but I am not going to do this.

The dental hygienist did not know if the dentist would have confidence in him to treat his patients, but he stated that he made it clear that he did not want this part of the job.

Concerning the question of what was the dentist's experience with cooperation with dental hygienists, the dentist answered:

> That it is an impossible cooperation. These are very cocky girls who do not listen and go their own way, and I mean that sincerely.

The dentist reported that this practice has had a high dental hygienist turnover, and he reflected:

> No one persisted with us; it is probably just us.

Interestingly, the dentist was open to more task delegation to the dental hygienist, including activities such as endodontics, dental crowns and dental bridges:

> It does not matter for me who does what, only if it is done well.

3.4.4.6 Dependent variables

The selection of this dental hygienist was based on his medium job content and the low score on job satisfaction, autonomy and low GNS in this large practice. At T2, he was not working in this practice anymore; therefore, he filled out the questionnaire for another dental practice. Compared with the data from T1, he was more satisfied with his new job, his income and his career. The job content in his new job was different; he did more tasks in periodontology and fewer caries treatments. In line with the changes in his job content, he also perceived lower overall job complexity and significantly higher job satisfaction compared with the practice from T1. We concluded that he found a job that was more aligned with his perceived competence and not very demanding. The extremely low GNS (2.33 on a 5-point scale) of this participant may explain why he was satisfied with the less-complex job content.

The dentist was reasonably satisfied with his job, income and career. Three other dentists in our study were more satisfied with all three aspects. This dentist may not be fully satisfied with his career because all of his plans have not been realized yet; he is still developing his practice, and he is opening practices at new locations.

Of the five practices with prophylaxis assistants, the assistants from this practice (n=13) scored precisely in the middle for their intrinsic job satisfaction (mean=4.25, SD=0.41), extrinsic job satisfaction (mean=2.92, SD=1.26) and satisfaction with their career (mean=4.27, SD=0.48).

The patients of this practice graded the received care and the communication as 8.1 and 7.8, respectively, on a scale from 1 to 10, which is also somewhat in the middle compared with the other practices. The technical competence of the personnel was graded positive, but some patients found it disturbing to be treated by more than one professional during a single treatment.

> The practice is good, but at checkups, you first get the assistant and then the dentist. I find this a mess, especially for children. For restoration, you sometimes see four different people, and it is not always pleasant.

Most of the patients were satisfied with their dentists but less satisfied with the work of the assistants. Two patients used the name dental hygienist when they referred to assistants; sometimes, it was unclear which professional was treating patients. One other aspect of this practice is that all treatments have to be paid for immediately, and several patients did not like this.

Overall, we concluded that the satisfaction of the professionals and the patients of this practice were in line with each other, except for the dental hygienist, who was far less satisfied compared with the other professionals. The mismatch between the dental hygienist's competence and the work demands was one of the important aspects for this low job satisfaction.

The dental hygienist made an additional comment about dental hygienists having low self-criticisms and comparing themselves too much with others. The new style dental hygienists feel that they have added value compared with the assistants and old style dental hygienists which is not true in the opinion of this dental hygienist.

The following factors are important aspects for the current task division and job satisfaction (Figure 11):

- This practice is the most profit-oriented of our six cases. Indeed, high tempo and performance are very important. After the dentist was not satisfied with the dental hygienist's tempo in making fillings, the dentist changed the dental hygienist's job content;
- Because the dental hygienist could not meet these high job demands, he no longer wanted to perform these tasks. Moreover, he felt incompetent in these extended tasks, which also influenced his perceived job characteristics and job satisfaction;
- The dentist strongly believed that a dentist should be the one to diagnose, indicate and control the required treatments in all patients (apart from the periodontology cases). Although many activities were delegated to the auxiliaries, the dentist did not relinquish the power of decision making or delegate the full responsibility and participation of patient treatment;
- There is almost no communication between the dentist and dental hygienist. The dentist is clearly the boss in this practice, and any employee may leave if they do not like the dentist's policy. The dental hygienist felt isolated, not involved and had low commitment, which could explain his perceived job characteristics and low job satisfaction.

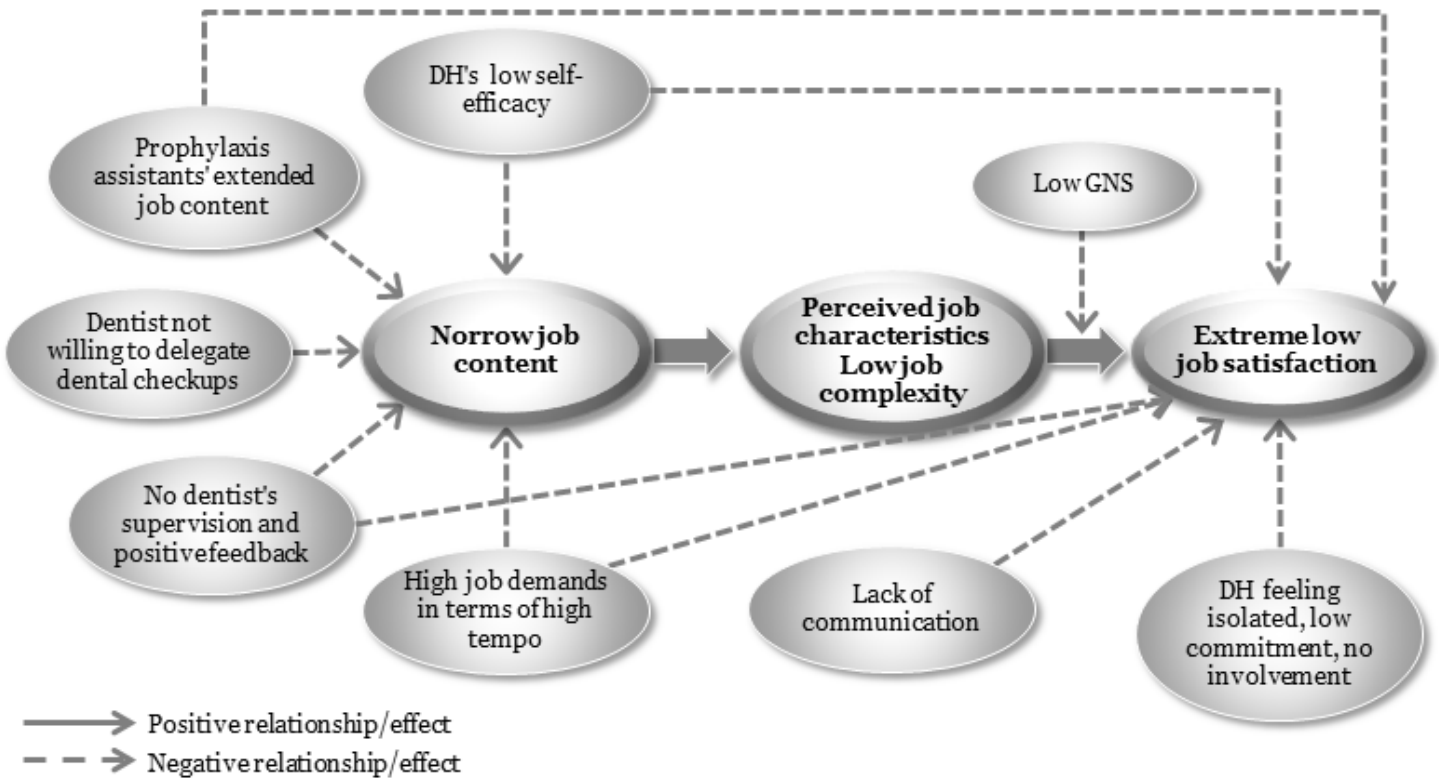


Figure 11. Important aspects explaining the dental hygienist's job content, perceived job characteristics and job satisfaction in USA case

3.4.5 Sweden case

3.4.5.1 Setting

This practice, which consisted of eight personnel, three dentist chairs and approximately 2,100 patients, is situated in a small town in the northern portion of the Netherlands. Two dentists, two dental hygienists and four dental/prophylaxis assistants were employed at the practice. The ratio between the dentists and other professionals involved in patient care (i.e., dental hygienist, prophylaxis assistants and dental assistants) was 1:1.3. The practice is located within a complex of three dental practices.

The dentist (female) has 28 years of experience and has owned and worked in this practice for 27 years. She works 34 h in patient care, and an additional 8 h are spent on organization and literature reading.

The dental hygienist (female) works 31 h per week, including 8 h in this practice. At T1, she worked 16 h in one of the other two practices located in the same building and filled out the questionnaire for that practice. In the meantime, she switched to working at this practice. In addition to this job, she works in a large group practice 23 h per week. At her former employer, she had a much busier schedule (25 to 30 patients a day) and performed more dental checkups and sealants.

In this practice, each patient visits the dentist first. The dentist devises a treatment plan, and referrals are made based on the treatment plan. The patients visit the dental hygienist for their regular treatment and visit the dental hygienist and the dentist on alternating visits for their dental checkups. One important aspect for the dentist in this practice is collectively taking care of patients and ensuring that everybody is satisfied and free to communicate.

It was possible to make an appointment with the dentist within one month, but not with the dental hygienist. This was because another dental hygienist was on pregnancy leave. In addition, more new patients have registered due to the arrival of a new dentist, which led to more referrals to the dental hygienist.

Since two weeks, another dentist joined the team, and the owner was planning to purchase a digital x-ray device. She would also like to improve the equipment in the dental hygienists' room, but this was long-term planning. The dentist estimated that the time spent on prevention was 20%, and she was satisfied with the amount of prevention activities in her practice.

3.4.5.2 Current task division

The dental hygienist treats patients with periodontal diseases, places sealants, takes x-rays, occasionally makes fillings and performs dental checkups. This dental hygienist was not specialized in any particular field, and the dentist would not want her to specialize in one particular field.

In her other job, the dental hygienist treated many patients with anxiety for dental treatments. Interestingly, she liked this kind of treatment and thought she was capable of treating patients with dental-related anxiety. Therefore, she would like to specialize in this patient group, but she does not know if there are possibilities to do so in this practice. She has not indicated this to the dentist.

The prophylaxis assistants remove calculus, give instructions in oral care and perform fluoride applications. They mostly treat children, handicapped patients and patients who need intensive counseling in oral care.

The current referral to the dental hygienist is based on one task only, in cases of sealants or fillings, and is based on a particular field in care regarding periodontal treatments. All patients are informed about their treatments and the professionals involved in the treatment. The dental hygienist finds this pleasant. At her former employer, the patients were not informed and were often in panic about what was going to happen. She refers to this as *not correct*. There are no structural consultations about patient treatments, although consultations occur incidentally in particular cases. There is ample time for consultations between the professionals, and the policy at this practice is to just walk in and ask.

There are approximately four structural consultations with all personnel each year where the organization, communication, devices, work processes and hygiene are discussed. The dentist makes an agenda and invites the personnel to contribute. Furthermore, the dentist stated that she felt like they were constantly in consultations. Indeed, if there was a need, they consulted each other immediately instead of waiting for a structured consultation.

The dentist reported that she was open to feedback and suggestions from dental hygienists, and she even asked them about their experiences in other practices to learn more about possible improvements she could make in her own practice. The dental hygienist also believed that both she and the dentist were open to suggestions from each other.

The dentist does not supervise the dental hygienists directly but is available if they have questions or difficulties during treatments. Indeed, the dentist sees every patient for a checkup, and she inspects the dental hygienist's work. In addition, the dental hygienist stated that she let the dentist inspect each preparation and each restoration to get feedback. Furthermore, the dentist checks all of the patients' dossiers and the declarations at the end of the day.

The dentist feels the final responsibility for all patients in this practice in the sense that she would be accountable if there were any problems. The dental hygienist feels responsible for her own patients in the sense that she will do everything in her capacity to make the patient better or refer the patient to another professional if she is not capable of helping.

3.4.5.3 Interpersonal relationship between the dentist and dental hygienist

The dentist typified her relationship with the dental hygienist as pleasant, and the dental hygienist graded their relationship as good. They both saw each other as colleagues.

3.4.5.4 Perspective on developments in task redistribution

The dental hygienist thought positively of task redistribution but stated that some older patients are not used to professionals other than the dentist. Younger patients, however, even ask if they may pay a visit to the dental hygienist.

The dentist thinks that the scenario of the Committee for Innovation in Oral Healthcare goes beyond the dental hygienist's scope of practice. She is not familiar with the terms *secondary and tertiary prevention*, and she imagines that dental hygienists could simply perform the tasks that they do now. Furthermore, she had observed some mistakes in dental checkups performed by dental hygienists; therefore, she believed that the committee's scenario would be irresponsible. The dental hygienist also had some doubts about the scenario. Indeed, she stated that dental hygienists could only perform within this scenario if they maintained all of their knowledge and skills:

> It is just like driving a car; when you have a license but you do not drive that often, it becomes even more exciting to start to drive again. This is exactly the same.

For the dentist, the ideal scenario in cooperation with the dental hygienist had already been achieved in her practice:

> In the beginning, I had some difficulties in giving away and delegating the tasks. After some time, I got used to this, and I like it very much; however, I do not feel that I should take it any further.

The dental hygienist would like to make more fillings; otherwise, she is satisfied with her scope of practice. The ideal scenario for her would be cooperation between the dentist and the dental hygienist with more consultation on patient treatment, the dentist's confidence in the dental hygienist and feeling comfortable. Both the dentist and the dental hygienist noticed that the pressure of work could decrease as a result of greater task distribution.

3.4.5.5 Determinants of the dentist's willingness to distribute more tasks

The dentist did not want to delegate more tasks to the dental hygienist. Regarding the caries treatments, she stated:

> I would not know if I could delegate more tasks to the dental hygienist. If they would like to make more fillings, I would have to hire an extra assistant. Moreover, they may only treat primary caries, and this does not occur often. There are more often combinations, and in this case, you would go to the dental hygienist for the primary caries and to the dentist for the secondary caries, which makes it complicated for me. This type of situation is not pleasant for anybody.

She also does not want to delegate more tasks to the prophylaxis assistant:

> I think that a prophylaxis assistant is educated for a particular field, and we have to hold on this. This is actually the same for the dental hygienist. I find that everybody must hold on to the scope of practice in which they were trained.

This dentist found it important for everybody to do all of the tasks for which they were competent. For dental hygienists, she felt responsible to refer some fillings to them to maintain their knowledge and skills. The dental hygienists like these tasks, and delegating some fillings is a way to make the job more attractive and to get more task variety. In busy times, however, the dentist prefers dental hygienists to perform more tasks in periodontal treatments.

The dentist finds appreciation for the dental hygienist as a person to be the most important aspect for task delegation. Furthermore, she stated that the dental hygienist's competence gave the dentist confidence in her. The dental hygienist believed that her dentist had confidence in her, and this is an important aspect because it motivates her to do her job better. She further refers to her experiences at a former employer where she did not feel that the dentist was confident in the abilities of the dental hygienists. Indeed, she even wondered why her former employer even employed dental hygienists in the first place:

> In such cases, you do your job reluctantly. You see the difference only when you start to work in another practice.

In the hypothetical scenario that the dentist was not able to treat her patients, she would let this dental hygienist take care of her patients. Indeed, the dentist stated that there was no fear if she performed within her scope of practice. According to the dental hygienist, there was one instance where the dentist was not able to treat her patients, and the hygienist performed the treatments within her scope of practice (mostly dental checkups).

The dentist's experiences in cooperation with dental hygienists had been positive, and she liked sharing the responsibility for optimal patient care, especially for patients with periodontal diseases.

3.4.5.6 Dependent variables

At T1, the dental hygienist worked at her former employer and was selected because of middle job content, high autonomy, low job satisfaction and low GNS. At T2, she still worked one day per week in Sweden case but filled out the questionnaire for another practice where she experienced higher intrinsic, extrinsic and career satisfaction. In addition, the new job resulted in changes in her job content. In the new practice, she performed more caries-related activities and was more involved in the oral healthcare policy.

The dentist in the Sweden case was the least satisfied dentist in our study regarding her income. The intrinsic job satisfaction and the career satisfaction scores were a bit higher, but they were still lower than those of the other three dentists, from our cases. The prophylaxis assistants in this practice had the highest intrinsic and extrinsic job satisfaction in our study.

The patients of this practice were by far the most satisfied patients of all six practices. They were satisfied with the received care, personal communication and all aspects from the DVSS. The patient compliments addressed the nice atmosphere, good communication, good relationship with the professionals and their feeling of being understood and being involved in the treatment. The only negative comments concerned an unfriendly receptionist.

Overall, we concluded that the professionals differed in their job satisfaction in this practice, but they had the most satisfied patients. The dentist wanted everybody to have suitable job content according to their education and capacities and be involved in the organization and feel comfortable in their jobs. This easygoing atmosphere was also felt by the patients of this practice.

The following aspects could explain the current task division in this practice (Figure 12):

- A very open relationship and communication between the dentist and dental hygienist. Indeed, both have respect for each other and were willing to cooperate and learn from one another;
- The dentist's opinion that dental hygienists should maintain skills in performing fillings and dental checkups. Although she would not be willing to expand the dental hygienist's scope of practice in terms of delegating the final responsibility or delegating a group of patients for complete oral healthcare, this dentist delegated dental checkups to the dental hygienist, and they performed dental checkups by turns on alternate visits.

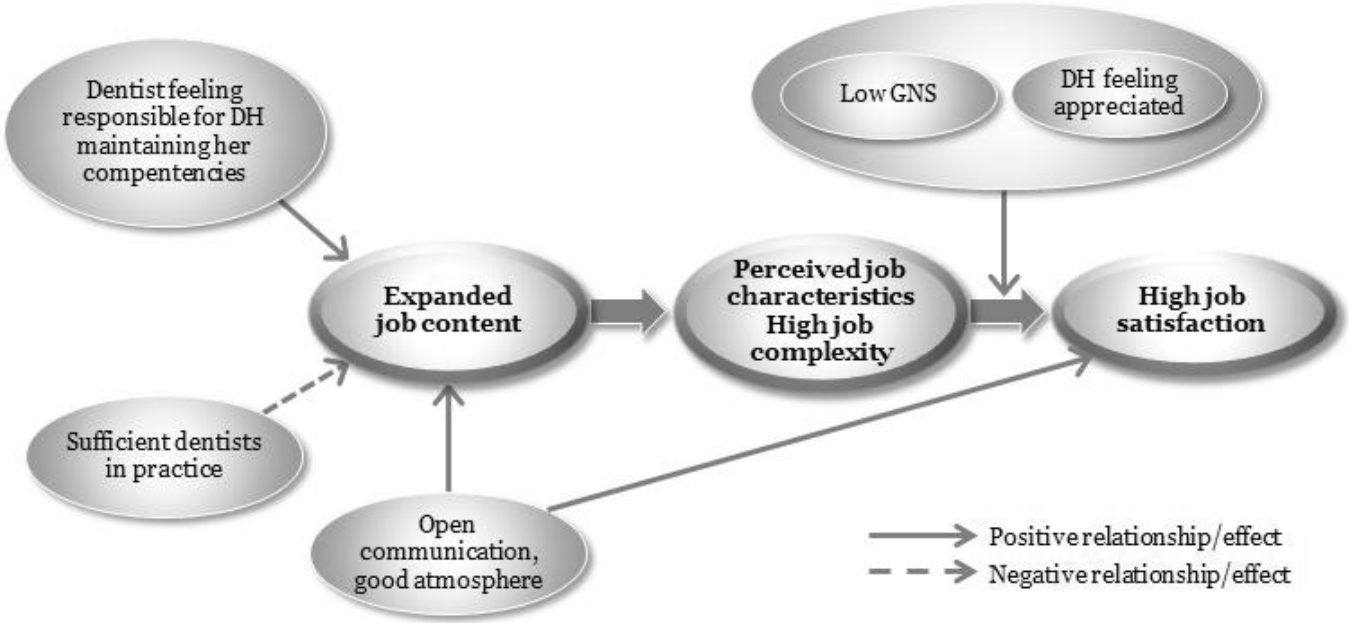


Figure 12. Important aspects explaining the dental hygienist's job content, perceived job characteristics and job satisfaction in Sweden case

3.4.6 Switzerland case

3.4.6.1 Setting

This practice, which consisted of seven personnel, three dentist chairs and approximately 2,000 patients, is situated in a large city and was established four years ago. Initially, this practice was a dental hygiene practice, but it changed to a general dental practice 1.5 years ago. In addition to the dentist, three dental hygienists, one dental assistant and one secretary worked there, and the owner's father did the administrative work. The ratio between the dentists and other professionals involved in patient care (i.e., dental hygienist, prophylaxis assistants and dental assistants) was 1:2.9.

The dentist (female) has nine years of experience and has worked for one year in this practice (for 28 hours in patient care). She is used to working within the switch system, and she has worked in many practices and is absolutely sure that she does not want her own practice or to be part of a large organization. This dentist is not the owner of the practice; the practice is owned by a dental hygienist. However, because of our focus on the cooperation and task distribution between the dentist and the dental hygienist, we interviewed three participants in this practice; the dentist, the dental hygienist and the owner.

> I do not want to plan; I do not want to organize.

The 26-year-old new style dental hygienist (female) worked 32 h per week as a dental hygienist, 16 h in this practice. Her other job was in a general dental practice where all patients first visit the dental hygienist who performs the screening and then refers patients to the dentist.

The owner-dental hygienist (female) has been a dental hygienist for six years and started this practice in 2004. She works 22 h per week in patient care and 30 more hours per week organizing the practice. Currently, she is completing additional courses to get her Bachelor of Health degree.

One group of patients in this practice was referred from other dentists for their periodontal diseases, and other patients received complete oral healthcare at this practice. If some patients who visited the practice for their dental hygiene treatments did not have a dentist, they were advised to seek one or to register in this practice. The dental checkups were always performed by the dentist. The owner explains the policy in this practice:

> We have a rule here that the dentist is the central person. If a patient is referred to the specialist, I always refer the patient to their dentist first

because he/she is the central person. Also, if you look at this in general, I do not think that the dental hygienist is the central person.

The dentist stated that the initial idea was that all patients would visit both the dentist and the dental hygienist, but to date, this has not been a realistic proposition. There is an enormous shortage of dentists and dental hygienists, and the dentist believed that the patients with periodontal diseases should be treated first.

It was not possible to make an appointment with the dentist within two months, but the dentist perceived the pressure of work as normal. The schedule of the dental hygienists was even busier, and it was not possible to make an appointment within three months. The owner perceived this pressure of work as high, whereas the dental hygienist stated:

It is still manageable.

This practice recently installed an additional (fourth) dentist chair, and the future plan was to have three treatment rooms for dental hygienists and two for dentists. The owner has been looking for quite some time for an additional dentist for her team, and she would also like to employ a prophylaxis assistant.

The owner estimated that the total time spent on prevention was 20%, but she would like this figure to be higher. Preventive care for children has especially been suppressed by the high number of patients with periodontal diseases. Interestingly, the dentist estimated that the amount of time spent on prevention was 10%, and she hoped that this would increase when all patients were put in order.

3.4.6.2 Current task division

The dental hygienist treated patients with periodontal diseases, placed sealants, made fillings, bleached teeth and dealt with pain consultations. The dentist stated that there is not always assistance when the dental hygienist is involved in a restoration, which makes it difficult to perform these tasks, especially in children. According to the owner, this dental hygienist was not specialized in a particular field, and she would not want her to specialize. The dentist had no opinion on this and stated: *this depends on them* (dental hygienist and the owner*)*. Interestingly, the dental hygienist thought about specializing in the hospital or in child oral healthcare in the distant future. She did not see any opportunities to specialize in child care in this practice because the dentist wants to do all of the dental checkups, especially in children. The only option would be to find a new job.

The dental assistant occasionally took over tasks from the dentist, but she did not have a different schedule. She removed calculus and provided fluoride application if the dentist needed time for a referral letter or patient administration.

Current referrals to the dental hygienist are only based on one task, in cases of sealants or fillings, and one particular field in care regarding periodontal treatments. According to the owner, she would not like the patients to be referred to the dental hygienist for complete oral healthcare because dental hygienists are not competent enough to perform dental checkups. The dentist agreed with this view.

There are no structural consultations about patient treatments or the organization in the practice, and most consultation occurred between appointments. The owner did not feel the need for structural consultations because of the small team. In addition, despite their part-time schedules, everybody sees each other and has the opportunity to consult their colleagues. If the team increased, the owner would organize structural consultations. The dentist and the dental hygienist added that all important decisions in the practice are communicated to the personnel, and they felt sufficiently involved in the decision making.

According to the owner, the dental hygienist was open to feedback, and she spoke out about her wishes and criticisms. They even organized a type of feedback day where they observed and commented on each other's work. The dentist found it difficult to supervise the dental hygienist in her restorative work because they worked different days during the week, and they were located too far from each other in the practice; however, the dentist scheduled some time to work together with the dental hygienist to increase her experience in the restorative tasks:

> Dental hygienists have to get a chance to practice more and develop a routine in these tasks.

Indeed, the dentist inspects all restorations made by the dental hygienist during a patient's dental checkup at the next visit. The dentist was convinced that the dental hygienist would consult with her if she was uncertain in her treatment, and the dental hygienist fully endorsed this. Further, the dentist and the dental hygienist stated that they were very open to feedback and suggestions, they often went to conferences together and they were willing to learn from each other. The dentist felt responsible for the patients referred to the dental hygienist. She made sure to keep informed on the treatment progress, and the dental hygienist felt responsible for the treatments she provided. Sometimes, the dental hygienist made a restoration in the absence of the dentist, but she could contact the dentist by phone in emergency situations.

3.4.6.3 Interpersonal relationship between the dentist and dental hygienist

The owner found it hard to define the personal relationship between her and the dental hygienist because they knew each other privately. They are both dental hygienists, and in this relationship, they are colleagues; however, the owner must also act as the employer at times.

Both the dentist and the dental hygienist identified their relationship as colleagues. The dental hygienist also answered:

> It is getting better. ...In the beginning, I had to get used to her. Her abrupt manner. In the beginning, it did not work out ...if she wanted me to make a filling, she was not that clear as to what exactly I should do. Yes, that is a learning process for both of us.

3.4.6.4 Perspective on developments in task redistribution

The dentist saw both pros and cons to task distribution. First, dentists must have a chance to specialize in a certain field to maintain interest in their jobs and provide high work quality because quality decreases in unsatisfied professionals. Secondly, the shortage in dentists and dental hygienists raises the problem of too much task distribution to incompetent professionals. But in the end somebody needs to help the patients. The dentist stated that all task distribution must not exceed the low boundaries. The following statement was the dentist's reaction to the scenario of the Committee on Innovation in Oral Healthcare:

> In this case, I am very greedy. I have to see the patients to take full responsibility for their mouth. Even if my dental hygienist or prophylaxis assistant is very good at his/her job, I want to see the patients once in a while.

The owner thinks that the committee's scenario is not achievable in such a short of period. Dental hygienists have a reputation as professionals involved in prevention and periodontal care. Even if dentists know that dental hygienists are educated for an extended scope of practice, they only hire dental hygienists for prevention and periodontal care. The owner is familiar with a few practices where dental hygienists screen patients and, if necessary, refer them to the dentist. She liked the idea, but in general, she thought dental hygienists lacked knowledge. Similar to cases were some dentists take too long to refer patients to the hygienist, the owner was afraid of dental hygienists taking too long to refer patients to the dentist (if the disease is already in an advanced state). The owner believed that all patients should visit both the dentist and the dental hygienist. Furthermore, she felt that the prophylaxis assistant could also be part of the committee's scenario, but she stated:

> In such a situation, the dental hygienist will go crazy from performing only periodontal treatments and some fillings in her scope of practice.

The owner of this practice did not want patients being treated by more than two different professionals. Therefore, task distribution between the dental hygienist and prophylaxis assistants for the same patients was not an option because each patient was already treated by the dentist.

The dental hygienist thought that task distribution was a positive development. She saw the future as patients going to the dental hygienist first, for their checkups and routine treatments, living more time for dentists specializing in particular fields. One important precondition would be that dental hygienist education must concentrate more on knowledge and skills for performing dental checkups. Furthermore, she thought the committee's scenario was possible, but not in the near future. The dental hygienist stated that the greatest obstacle for optimal task distribution is the fact that dentists do not know which tasks and what kind of care dental hygienists can offer. The younger generation of dentists does not know what dental hygienists are or what they can do, and the older generation of dentists is generally negative about new dental hygiene education.

At the time of the interviews, the state of this practice was close to ideal cooperation for this dental hygienist. The only debatable issue was with dental checkups. The dental hygienist believed that the owner could change her opinion on this when the owner completes the Bachelor of Health courses, and the owner would discuss the possibilities for dental hygienists performing dental checkups with the dentist again. Furthermore, the dental hygienist referred to ideal cooperation as a good relationship with the dentist, where they were open with each other and equal to one another, and the rest *will be fine*. The dental hygienist was not familiar with the work of the prophylaxis assistants. In addition, she questioned their competence and would not delegate tasks to them:

> I prefer only the dentist and the dental hygienist; there is a clear difference between those two. The more people that get involved, the more awkward and more complicated it gets for the patient.

The ideal scenario for the owner would be to have more specialties in her practice, such as implantology, periodontology and endodontology. Additionally, she would like the dental hygienist to perform more complex fillings and maybe even simple extractions; however, she has not mentioned this to the dentist. The dentist refers to ideal cooperation as the way the practice has been running, but she would prefer more dental hygienists and prophylaxis assistants so she could delegate more tasks.

The owner was convinced that dental hygienists and prophylaxis assistants could do more work and take some of the weight off of the dentist's busy schedule, but only if dental hygiene education prepare dental hygienists to perform all extended tasks well. Her opinion was not based only on experiences with new dental hygienists, but she felt the same way about the old three-year curriculum. The dentist and the dental hygienist shared the opinion that work pressure would decrease as a result of task distribution. The dental hygienist added that the pressure of work could increase if the work was not delegated properly.

3.4.6.5 Determinants of the dentist's willingness to distribute more tasks

According to the owner, the dentist in this practice delegated very easily. The dentist was willing to delegate more fillings to the dental hygienist, but the dental hygienist had been too busy with periodontal treatments. The dentist would also delegate more preventive tasks to prophylaxis assistants, but the reorganization of the practice and more employees were needed.

This dentist was not convinced of the dental hygienist's competence, but she had confidence in her because of the dental hygienist's good self-reflection. The dental hygienist indicated that she was uncertain about her restorative skills, but the dentist encouraged her to perform restorations. The owner stated that the dental hygienist's nagging doubt about her restorative work was a matter of her character, but she preferred that type of attitude compared with a reckless one.

In the beginning, the dental hygienist wanted to take over more tasks from the dentist; she liked to do dental checkups as she performed checkups at her other job. She realized, however, that the dentist was more competent in performing these tasks. She could only imagine dental hygienists doing dental checkups and being responsible for low-risk patients with stable dental health.

The owner would like to have a prophylaxis assistant on the team, but she preferred prophylaxis assistants with a recognized certification. The assistant's scope of practice would include preventive tasks for patients without periodontal diseases and fluoride application in children. This assistant, however, must be communicative and familiar with the patients before she would get a chance to complete the prophylaxis course.

In the hypothetical scenario that the dentist was not able to treat her patients, she would not let this dental hygienist take this over from her:

> She cannot do the job. She does not dare, and this would fall flat with the patients.

The dentist stated that most of the patients were used to being treated by a dentist with authority and not by *some girl*. Concerning the same hypothetical scenario, the dental hygienist stated:

> We already talked about dental hygienists doing dental checkups in the future, and at that time, the dentist had a very definite answer: 'I do not want this'; so, I think it is not a matter of trust. She simply does not want this… I think because we are not competent enough. …And yes, I understand that. I find it very logical.

This dentist has experience in working with dental hygienists, and she would *not want this another way*. She understood the importance of treating patients with

periodontal diseases, and not having time to perform these treatments by herself made her prefer working with a dental hygienist.

3.4.6.6 Dependent variables

This dental hygienist was the most satisfied dental hygienist among our cases. She obtained the maximum scores in all three aspects of job satisfaction. The dentist was also highly satisfied with her job, income and career. Moreover, the owner was satisfied with her job and career, but less satisfied with her income. The dental hygienist's job content in this practice was less extensive than in the other practice where she worked, but she was satisfied with the work and the organization. At T2, she was performing more caries diagnosis, treatment planning and decision making, but she experienced less autonomy and far more role conflict compared with T1, which could explain the small decrease in her job satisfaction at T2.

The patients of this practice were extremely satisfied; only the patients of practice Sweden were more satisfied. The only remarks made concern the current dentist being less social than the previous one and the busy schedule.

The following aspects could explain the current task division in this practice (Figure 13):

- The practice is owned by a dental hygienist with a clear view on the oral healthcare and organization in this practice aiming towards optimal task redistribution between different occupations. This view is also visible to other professionals, and there is ample communication on this matter;
- Organizational aspects concerning the dental hygienist's busy schedule. This practice was a dental hygiene practice for several years, and most patients are still referred for their periodontal treatments. Furthermore, there is a waiting period for these appointments;
- The dentist was willing to delegate more fillings to the dental hygienist after the diagnosis is made by the dentist herself, but she was not willing to delegate the patients for dental checkups. In this case, the task division will never gain the level of the scenario of the Committee on Innovation in Oral Healthcare because the task redistribution is task-based and not patient-based;
- The dentist's strong opinion that the dentist should have the final responsibility for each patient, not the dental hygienist – on which the owner agrees. This is in line with task-based delegation, which is where single tasks are delegated, and there is no full involvement in patient treatment.

Figure 14 is the overall model of the important factors explaining dental hygienists' job content, perceived job characteristics and job satisfaction in all six cases.

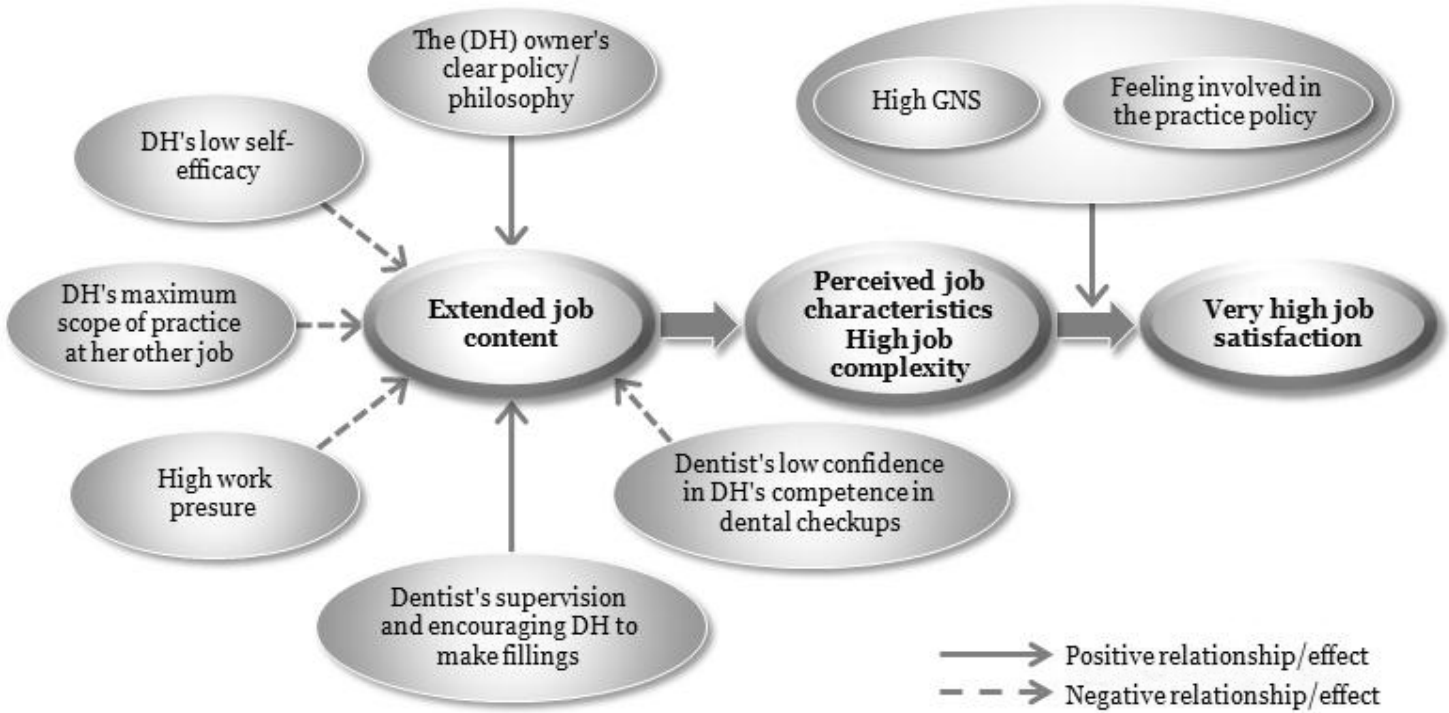


Figure 13. Important aspects explaining the dental hygienist's job content, perceived job characteristics and job satisfaction in Switzerland case

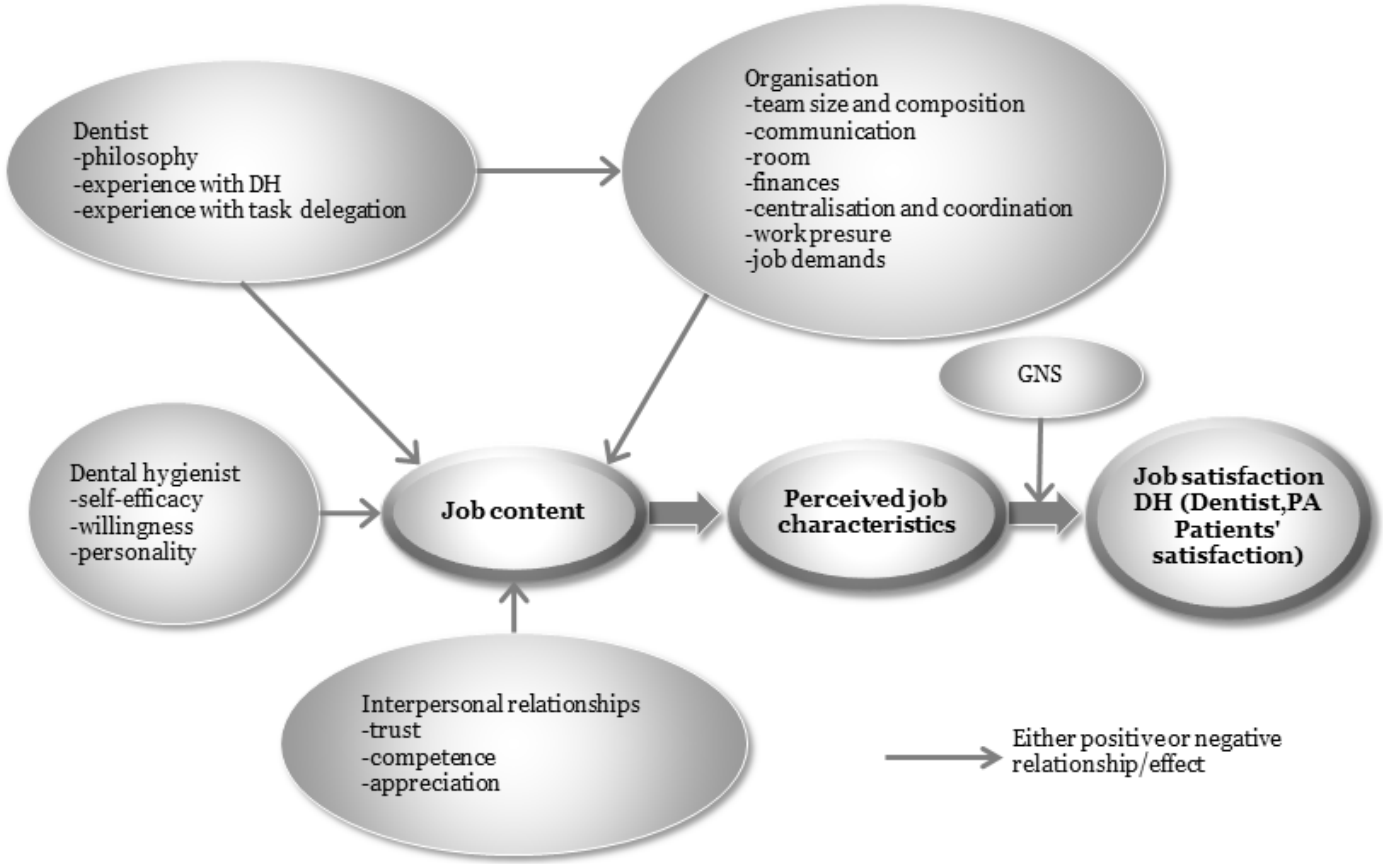


Figure 14. Overall model; important factors explaining dental hygienists' job content, perceived job characteristics and job satisfaction

3.5 Contribution of organizational factors: cross-case analysis

In a cross-case analysis, we compared the patterns of organizational factors (identified in single cases as potential explanatory variables) and task division, perceived job characteristics and job satisfaction. In this section, we describe the organizational factors and their possible influences on the dependent variables of interest. But first, we provide an overview of the cross-case analysis of the two dependent variables: workers job satisfaction and patient satisfaction.

3.5.1 Worker and patient satisfaction

The job satisfaction of the participants in the interviews (i.e., the dental hygienists and dentists) and all prophylaxis assistants for each practice are presented in Table 10. The results show that dentists' and prophylaxis assistants' scores of intrinsic job satisfaction were more similar to each other than comparisons between dental hygienists' scores of intrinsic job satisfaction and the other professions. The dental hygienists from Iceland and Switzerland were the most satisfied workers among the six practices we examined. Interestingly, the dental hygienists from the other four practices scored far lower than their dentists and prophylaxis assistants.

In all groups of professionals, there are some differences in extrinsic job satisfaction, but the prophylaxis assistant group seemed to be the least satisfied with their income. All dentists and prophylaxis assistants were satisfied with their careers, but three of six dental hygienists were not. These dental hygienists were also less satisfied with their jobs.

The most satisfied patients were those of the practice in Sweden (i.e., this practice had the highest mean scores on all of the measured aspects in patient satisfaction). Although the practice in Germany scored the lowest (Table 11), the absolute scores were satisfactory on a 10-point scale. For example, Germany had a mean score of 7.2 on overall patient satisfaction. The patient grades and the DVSS scores were comparable (Table 10 and 11). High turnover was the most common criticism, and friendly personnel was the most common compliment. Interestingly, the three practices with the highest turnover scored the lowest on patient satisfaction. The most appreciated qualities of the practice in Sweden were patients' feelings of involvement, being informed about their treatments and receiving personal attention.

Table 10. Workers' job satisfaction for each practice

Case Job satisfaction scales	IS PA n=2	PL PA n=2	DE PA n=1	USA PA n=13	SE PA n=1	CH*** PA n=0
Intrinsic job satisfaction (IJS)						
Dentist	3.78	4.89	4.11	4.22	4.44	4.67
Dental hygienist *	5.00	3.89	3.56	2.67	3.89	5.00
Prophylaxis assistants	4.17	4.28	4.56	4.25	4.67	--
Extrinsic job satisfaction (EJS)						
Dentist	4.00	5.00	3.50	3.50	2.50	4.00
Dental hygienist*	4.00	4.00	3.50	1.00	3.00	5.00
Prophylaxis assistants	2.75	3.00	2.00	2.90	4.00	--
Career satisfaction						
Dentist	5.00	5.00	4.00	4.00	4.00	4.50
Dental hygienist*	5.00	3.00	4.00	2.50	3.50	5.00
Prophylaxis assistants	4.75	4.50	4.00	4.27	4.00	--

* Data from dental hygienists at T1, data from dentists and prophylaxis assistant at the time of the interview.
**The scores of the dental hygienist–owner of the practice are IJS=4.89, EJS =3.00 and career satisfaction=5.00.

Table 11. Patient perception and satisfaction

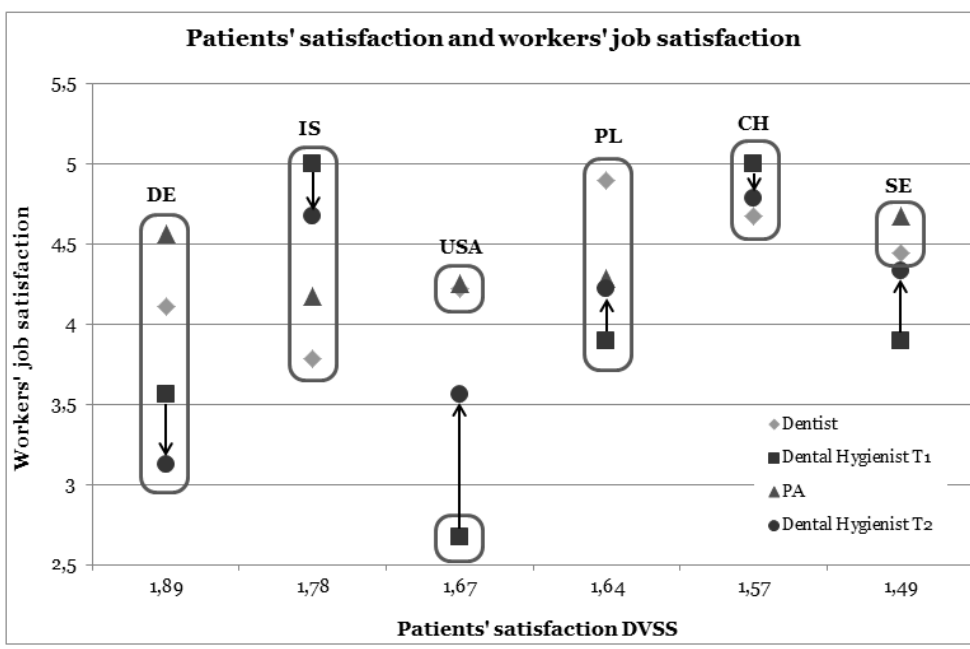
Case	Received care Mean	Personal com. Mean	Patient comments
IS	8.1	7.9	Friendly people, fine practice, avoided private conversations between dentist and assistant during patient treatment
PL	8.1	8.0	High turnover, little communication about turnover, highly satisfied about the received care and services
DE	7.3	7.0	High turnover, German dentists do not speak Dutch, friendly receptionists
USA	8.1	7.8	High bills must be paid immediately, several professionals involved in a single treatment, satisfied with the quality, high turnover
SE	8.5	8.6	Fine practice, friendly and adequate people, feeling of involvement in own treatment, personal attention
CH	8.4	8.3	High quality, professional and friendly people, practice is too busy

Table 12 presents the three aspects of the DVSS and the total score per practice (the lower the score, the higher the satisfaction). In general, patients were the least satisfied with the information and communication aspects; however, the absolute figures were satisfactory. Within the range of 1 to 5 (1=completely agree and 5=completely disagree), all practices scored between 1 and 2.

Table 12. Dentist Visit Satisfaction Scale (DVSS)*, mean (SD), range 1-5

Case (response %, n)	Information – comm. Mean (SD)	Understanding – acceptance Mean (SD)	Technical competence Mean (SD)	Total score DVSS* Mean (SD)
IS (38%, 71)	1.81 (0.73)	1.78 (0.68)	1.73 (0.51)	1.78 (0.53)
PL (17%, 33)	1.71 (0.62)	1.57 (0.67)	1.64 (0.58)	1.64 (0.56)
DE (20%, 16)	1.92 (1.16)	1.85 (0.86)	1.92 (0.86)	1.90 (0.88)
USA (32%, 61)	1.72 (0.56)	1.58 (0.66)	1.69 (0.52)	1.67 (0.47)
SE (21%, 24)	1.56 (0.64)	1.47 (0.57)	1.38 (0.49)	1.49 (0.46)
CH (58%, 35)	1.69 (0.54)	1.57 (0.56)	1.48 (0.49)	1.57 (0.44)
TOTAL(30%, 240)	1.74 (0.67)	1.64 (0.66)	1. 65 (0.56)	1.68 (0.54)

* The lower the score, the higher the satisfaction.



* DH data at T2 from another practice.
** DH data from T1 and T2 from another practice.
Figure 15. Patient satisfaction and job satisfaction of the professionals

Figure 15 shows a possible trend in patient and worker satisfaction. The most satisfied patients were found in practices where there was minimal difference in job satisfaction between the employees. Furthermore, we found that the change in the dental hygienist's job satisfaction between T1 and T2 in three out of four participants who worked in the same practices at T1 and T2 was approaching their respective colleague's job satisfaction. This indicates a possible influence of interpersonal factors in the perception of job satisfaction; however, these findings are based on small absolute differences in patient satisfaction between practices.

Although it appeared that the patients were most satisfied in practices where little variation was found in job satisfaction between the workers, we found that worker and patient satisfaction were not related.

In the next sections, we discuss the following organizational factors of influence on the presented workers' and patients' satisfaction and the task division in dental practice, with a focus on the job content of dental hygienists:

- Care demands and care supply: dentists' and dental hygienists' FTE in combination with the care demands in the practice;
- The presence and job content of prophylaxis assistants;
- Whether the dental hygienist position was a new position or an existing job position in this practice;
- Communication and negotiation between dentists and dental hygienists about the dental hygienists' job content and the task division.

3.5.2 Care demands and care supply

From our surveys and case studies, the core activities of all dental hygienists are periodontology and preventive care (see Section 3.1). These appear to be the primary responsibilities because dental hygienists work too few hours per week at one practice to perform all of the extended tasks given the high demands for periodontal care.

Limited dental hygienists' FTE is a barrier to the dental hygienists' expanded job content. This was clearly visible in the Germany practice, where the dental hygienist had the ambition to expand his job content, but several factors (i.e., he was the only dental hygienist, he only worked one day a week and he worked with five dentists) prevented him from performing any tasks other than periodontal care. In the Poland and Switzerland practices, there was also a high demand for periodontal care, which had to be met before any additional tasks were transferred to dental hygienists. The Iceland practice was the only practice where the dental hygienist had sufficient time left in her schedule to perform tasks other than periodontal care.

Dental hygienists primarily perform periodontal treatments because these tasks cannot easily be transferred to another occupation. Dentists from our case study mentioned the lack of time and motivation to perform periodontal tasks by themselves, and prophylaxis assistants are not educated to perform full periodontal care. Therefore, dental hygienists are responsible for the first line of care in periodontal treatments, which limits expansion in job content.

In the Netherlands, limited dental hygienists' capacity in a practice is related to difficulties in hiring dental hygienists (due to a shortage of dental hygienists) (described in Section 3.3). In addition, many dental hygienists are employed part-time.

Like the six dental hygienists from the case studies, more than half (55%) of the dental hygienists from our survey work part-time at two or more jobs, which negatively affects the expansion of their job content. These dental hygienists provide core tasks in preventive and periodontal care, and they can only expand their job contents if their schedules are not full. This was especially evident in the Germany, Switzerland and Poland practices.

Dental hygienists have indicated that working in multiple practices contributes to their overall job satisfaction. Dental hygienists from the Poland and Switzerland practices, as well as from our survey, deliberately combined jobs to increase their overall skill variety at work and prevent physical strain by working in different types of practices and with different patients. The dental hygienist from the Poland practice even mentioned that the combination of both jobs was the reason why she liked working as a dental hygienist.

In line with the dental hygienists' desires for part-time jobs, we discovered that most dental practices are only looking for part-time dental hygienists to provide periodontal care for their patients. The fact that dentists are not familiar with the expanded scope of practice of new style dental hygienists could play a role. The dentists do not know how to use dental hygienists optimally, or they simply prefer dental hygienists performing only periodontal care. Dentists' views on dental hygienists expansion of scope of practice in relation to task division is examined in the next section.

A dentists' capacity in a practice has an influence on the task division in general and on the division of caries-related tasks between dentist(s) and dental hygienist(s). When dentists are able to perform all tasks by themselves on short notice, they are not *forced* to delegate tasks/patients to other dental professionals. For example, before an additional dentist was hired, the dental hygienists from the Poland and Sweden practices used to perform dental checkups and fillings more often. Since the hiring of the additional dentists, all such tasks/patients have been scheduled for the new dentist, which has left the dental hygienists with far less extended job content. In the Germany case study, the sufficient dentist resources also negatively influenced the dental hygienist's scope of the job.

In summary, dentists' and dental hygienists' formation and care demands influence the task division within a practice and indirectly influence the perceived job characteristics and job satisfaction. In the Germany and Switzerland practices, the job satisfaction of the dental hygienists was clearly negatively influenced by the high demands for periodontal care. There was little room for changes in their job content, and they reported that this decreased their job satisfaction.

Dentists' and dental hygienists' formation in a practice, in combination with high periodontal care demands, also affects patient satisfaction in the sense that patients are less satisfied in practices where there are long waiting times for appointments (e.g., the Switzerland case study).

We concluded that the shortage of dental hygienists, the limited capacity of dental hygienists hired by practices (given the high periodontal care demands), and the dental hygienists' own desires for combined jobs are interrelated. In the current situation, only a small number of dental hygienists have room in their schedule for additional tasks. The largest part of the hygienist profession is performing care in periodontology, and periodontology demands are expected to increase in future years.

3.5.3 Presence and job content of prophylaxis assistants

The presence and job content of prophylaxis assistants in a practice may have direct consequences for the dental hygienist's job content and vice versa. The best example of this mechanism is the task division in the USA case, where prophylaxis assistants worked closely with dentists and had expanded job content. In this practice, there was no obvious role for a dental hygienist within the switch system, and he was *left on his own* as a type of *specialist* in periodontal care. In the other four practices that employed prophylaxis assistants, the prophylaxis assistants had less-expanded job content, but there were some differences in how this was managed. In the Sweden and Iceland practices, there was a clear distinction in job content between the prophylaxis assistants and dental hygienists. In the Germany and Poland practices, however, no clear and explicit task division exists. In these last two practices, dentists refer patients to either a dental hygienist or a prophylaxis assistant based on detection and diagnosis, but patients were occasionally referred to the wrong occupation. In the Poland practice, there were also a few experienced prophylaxis assistants whose job content was very similar to that of dental hygienists. In Switzerland, the owner was trying to establish a situation in which all patients visit the dentist and the dental hygienist. In the future, the owner believed that it would be possible to have a scenario in which patients with DPSI (Dutch Periodontal Screening Index) 1 and 2 (i.e., patients with gingivitis and calculus) are referred to the prophylaxis assistants, and patients with DPSI 3 and 4 (i.e., with mild and severe periodontitis) are referred to the dental hygienists. She does not envision the possibility for dental hygienists to work together with prophylaxis assistants, which was proposed by the Committee on

Innovation in Oral Healthcare. Interestingly, she also mentioned that having a dental hygienist's job content consist of only periodontal treatments was not desirable.

In our cases, the interrelation between dental hygienists and prophylaxis assistants was comparable to that between dentists and dental hygienists. In both relationships, the more highly educated professionals tend to resist task delegation to the lower educated professional. According to Abbott (1988), the dynamics between dentists and dental hygienists and dental hygienists and prophylaxis assistants could be explained in terms of overlap in professional domains and/or gray areas in job contents, which was confirmed in our case studies. In both relationships, however, other factors, such as appreciation, confidence and perceived competence of the subordinate occupation, are important for the willingness of the dominant profession to delegate tasks. Most dental hygienists from our cases had little appreciation or confidence in the prophylaxis assistants' competence. In general, five dental hygienists from our cases were slightly willing to delegate tasks to prophylaxis assistants, but they were afraid of reductions in their own job content and decreased task variety. According to the hygienists, their job content would only include complex periodontal treatments that caused physical strain. The dental hygienist from the Switzerland practice was not willing to delegate any tasks to prophylaxis assistants because of concerns about job content and diminished task variety. More complex coordination (mutual adjustment) between the three occupational groups (i.e., dentists, dental hygienists and prophylaxis assistants) was mentioned as a additional reason for not delegating tasks to prophylaxis assistants.

In the ideal scenario of the Committee on Innovation in Oral Healthcare, the prophylaxis assistants have a clear role in a dental team by assisting dental hygienists in providing preventive care. In the five cases with prophylaxis assistants present, the job content of the prophylaxis assistants was directed by dentists/employers (i.e., dental hygienists were not involved in defining prophylaxis assistants' job contents). Moreover, the prophylaxis assistants assisted the dentists rather than the dental hygienists, which explained why there was no communication or cooperation between the dental hygienists and the prophylaxis assistants.

The dentists from the Poland and USA cases were satisfied with the job content of their prophylaxis assistants because they use this occupation in the most optimal way. In the Poland practice, prophylaxis assistants have similar job content as dental hygienists regarding periodontal treatments. In the USA practice, the prophylaxis assistants intensively participate in the daily dentists' work. In both of these practices, the job content of prophylaxis assistants positively influences the dentists' job satisfaction (based on the dentists' statements during the interview). In the other practices, the prophylaxis assistants have a less prominent position in

the work structure; therefore, this factor does not contribute to the job satisfaction of the dentists.

In our five cases with prophylaxis assistants, we did not find any relationship between the assistants' job content and their job satisfaction. For example, the prophylaxis assistants with more expanded job content did not report a higher level of job satisfaction. In the USA case, however, the prophylaxis assistants' job content negatively influenced the dental hygienist's job satisfaction. This dental hygienist compared himself to the assistants and concluded that he had no more expanded job content than the assistants, which was one factor that decreased his job satisfaction. In other practices, dental hygienists' job satisfaction was not reported to be related to the job content of the assistants.

In conclusion, the job content of prophylaxis assistants is primarily directed by dentists. Dental hygienists are not involved in the task division between themselves and prophylaxis assistants. Dental hygienists are only slightly willing to delegate tasks to prophylaxis assistants for two main reasons: 1) a reduction of their own job content (i.e., decreased task variety) and 2) low appreciation, confidence and perceived competence of the prophylaxis assistants.

3.5.4 New versus an existing job position

There was a clear difference between the dental hygienists' job content in the practices where a dental hygienist took over an existing job position (from a two- or three-year-educated dental hygienist) and the practices where a new job position was created for the dental hygienist. In our cases, we observed that the dental hygienists who took over existing jobs had less-expanded job content and were facing difficulties in extending their job content. In these cases, the dentist-employer had just been looking for a dental hygienist to fill a vacancy and treat patients who already had appointments. These employers did not define the roles and tasks for a new position; thus, they did not have to reconsider the existing task division. This was especially evident in the Poland and Germany practices, where dental hygienists reported having to inform the dentists about their competencies and corresponding job desires, but the existing care demands and the existing job description left no room for changes in their jobs.

The dental hygienist from the Iceland case was the first dental hygienist working in the practice after a period of 18 months without one, and the dentist was very satisfied to employ a dental hygienist again. Because there were no patients scheduled for dental hygiene appointments at the time the hygienist was hired, the dentist and the dental hygienist discussed the job content together. In the Switzerland practice, the dental hygienist was hired as an additional member of the team, and the owner was specifically looking for a dental hygienist with a Bachelor of Health degree capable of performing extended tasks. These two practices involved greater communication and consultation between the dentist and the

dental hygienist about the dental hygienists' job contents. A dental hygienist's possibility to design a new job (in cooperation with their employer) was positively related to their job satisfaction. Indeed, the dental hygienists from the Iceland and Switzerland cases were the most satisfied among our cases.

In conclusion, a newly created position and a dental hygienist's active participation in designing the job increase the chances to expand the job content, and increases job satisfaction. When hired for an existing position, the chances to expand job content are lower. Dentists do not feel that they have to redesign the existing task division and adjust dental hygienists' job content. Additionally, dental hygienists' desires to craft their jobs differently are not always communicated to the dentist-employer, which brings us to the next factor.

3.5.5 Communication and negotiation about dental hygienist's job content and task division in practice

In all six cases, the discussion between the dentist and dental hygienist about the dental hygienist's job content occurred at the start of the dental hygienist's employment. Interestingly, the dental hygienist's job content was only re-evaluated in the Switzerland and USA cases. In the Switzerland practice, the employer was searching for ways to better organize the care. In the USA case study, the employer's dissatisfaction with the dental hygienist's work led to the evaluation. In the Poland and Germany practices, the dental hygienists had their preferences, but they were very much aware of the restrictions in the practices and the dentists' different views on dental hygienists' job content. The dental hygienists from the Iceland and Sweden cases were generally satisfied with their current jobs and only wanted to make small adjustments in their roles and tasks (i.e., they had no major ambitions for more task expansion).

In three cases (Iceland, Sweden and Switzerland), dental hygienists' preferences for future development in their job content or desire for small changes in their jobs were not communicated or aligned with the dentists. In the other three cases (USA, Poland and Germany), the dentists had completely different views and preferences on the future development of their dental hygienist's job content. In the Switzerland practice, the dental hygienist did inform her employer (another dental hygienist) about her preferences in job content, but this was not communicated to the dentist.

Five of the six dentists from our cases had a clear view on future task division and practice organization. In most cases, this was also communicated to the dental hygienists and other employees. For the dentist in the Sweden case study, no view was communicated during the interview other than continuing the practice within the current organization. The dental hygienist in the Iceland practice was not familiar with the dentist's plans and views for the future, and the dental hygienists in the Germany and USA cases absolutely did not adopt the dentists' views of the

future of the dental hygienists' job content and task division. The dental hygienist in the Poland practice was informed about the dentist's view and preferences for the dental hygienist's job content, and she adopted this plan, though she was not enthusiastic about it. In Switzerland, the owner (a dental hygienist) and the dentist shared views on task division, including the decision of only having dentists perform dental checkups. The dental hygienist with the Bachelor of Health degree, however, hoped that the owner would change this view and agree that dental checkups could also be performed by dental hygienists.

In conclusion, a lack of communication between dentists and dental hygienists about task division, dental hygienists' low ambitions and their non-participation in organizational redesign seems to negatively influence dental hygienists' job satisfaction. Hygienists who did not experience room to change/improve their jobs showed decreased job satisfaction. The different views on dental hygienists' job content between the dentists and the dental hygienists led to the hygienists leaving the practice in the USA and Germany cases. Because dentists are unaware of dental hygienists' need for communication and changes in their jobs, dentists' job satisfaction was not influenced by this factor.

3.5.6 Conclusion

Overall, single factors and combinations thereof were identified as significantly affecting task division, perceived job characteristics and job satisfaction in dental practices. The influence of each of those factors on the task division in each practice is given in Table 13. The first major limitation for expanding dental hygienists' job content and increasing job satisfaction is the misbalance between the care demands and care supply in terms of high periodontal care demands and low dental hygienists' capacity per practice (Figure 16). Current dental hygienists' employment and job content is partially due to the novelty of the new style dental hygienists' scope of practice (dentists do not know how to effectively use dental hygienists), growing periodontal care demands and dental hygienists preferences for combined jobs. The second important aspect is how task division is created in a practice. Little communication about task division and the possibility to delegate tasks to prophylaxis assistants was observed between dentists and dental hygienists. Most dental hygienists did not inform their employers about their preferences. In addition, dentists did not feel the necessity to discuss the current task division, and dental hygienists were not willing to delegate tasks to prophylaxis assistants. Interestingly, more dynamics in task division discussions were observed in new dental hygienists' positions compared with existing positions.

In addition, the present study dealt with relatively small practices, which were often managed by dentist(s) who were the ones that employed the dental hygienists, other dentists and assistants. In line with Abbott's theory of interdependency between professions and fights over jurisdiction in professional domains, we also examined personal and relationship factors that influence the

process of task redistribution between dental professions. We argue that most of the organizational factors mentioned above are the result of the dentists' and dental hygienists' individual factors. Therefore, in the next Section, we focused on the effect of the individual factors of dentists and dental hygienists and their relationships on task division, perceived job characteristics, worker job satisfaction and patient satisfaction.

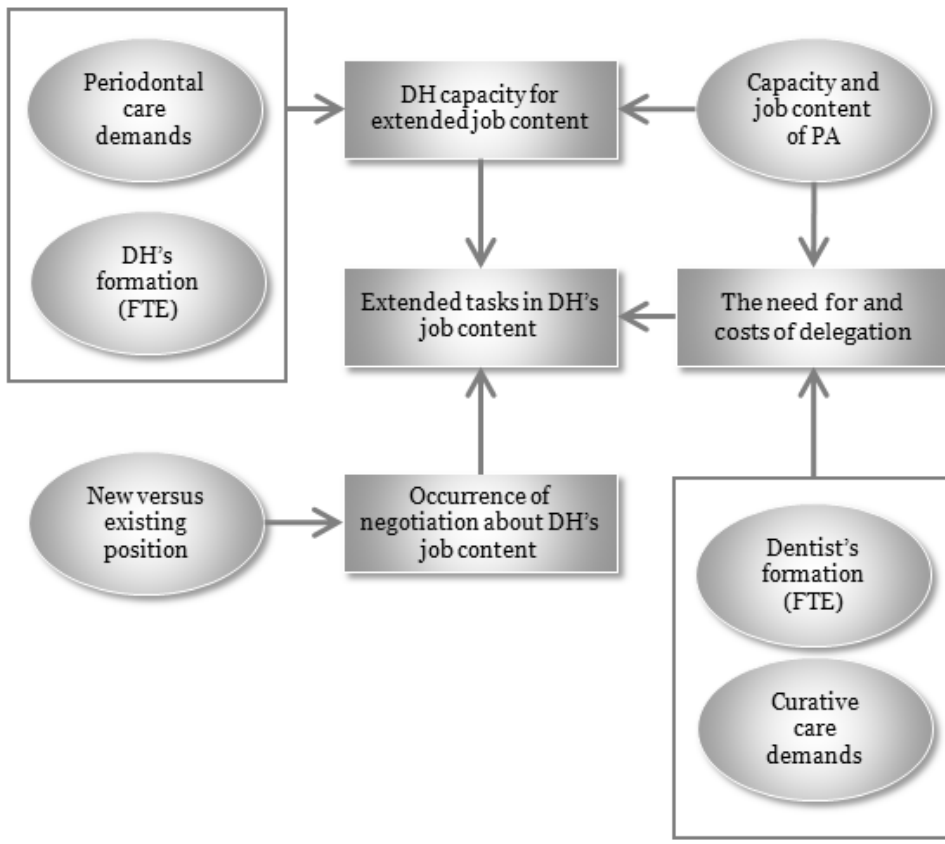


Figure 16. Organizational factors affecting dental hygienists' job content

Table 13. Organizational factors affecting DHs' engagement in extended tasks

Cases Organizational factors	Iceland	Poland	Germany	USA	Sweden	Switzerland
Dentists' formation	Sufficient dentists' formation. Factor does not negatively affect DH's extended tasks.	Recently, one additional dentist was employed, which decreased the need for DHs to engage in extended tasks.	Far more dentists than DHs. Less need for DHs to engage in extended tasks.	Far more dentists than DHs – no direct effect on DH's job content due to particular work structuring in this practice.	Recently, one additional dentist was employed, which decreased the need for DHs to engage in extended tasks.	Insufficient dentists' formation. Therefore, tasks must be delegated to the DH.
Dental hygienists' formation in combination with periodontal care demands	High formation of DH. Periodontal care demands are met, and there is room for DH to engage in extended tasks.	Low formation of DHs. Thus, limited capacity to answer to the high periodontal care demands.	Insufficient formation of DHs (i.e., not enough capacity to meet high periodontal care demands).	Low formation of DHs, but sufficient to meet the care demands in periodontal care. No effect on task division.	Sufficient formation of DHs, sufficient to meet periodontal care demands and to leave room for extended tasks.	Insufficient formation of DHs (i.e., not enough capacity to meet high periodontal care demands).
The presence and job content of prophylaxis assistants (PAs)	Clear division in tasks between DHs and PAs, no direct effect on DH's job content because of the high DH's formation (FTE).	PAs with similar job content as DHs, affecting DH's job content because only severe periodontal treatments are referred to DH.	Too low FTE of PAs, affecting DH's job content: simple preventive tasks are referred to the DH, which leaves no room for expansion of the job content.	All patients are treated by PAs, which affecting DH's job content: only severe periodontal treatments are referred to DH.	Clear division in tasks between DHs and PAs, no direct effect on DH's job content due to the sufficient FTE of both.	No PA present.

Cases Organizational factors	Iceland	Poland	Germany	USA	Sweden	Switzerland
Taking over existing job or creating new job in the practice	The dentist and the DH created a new job for the DH according to the DH's competencies.	DH's job content is clearly defined for an Old style DH and focused on tasks in periodontal care.	DH's job content was focused on the traditional tasks as they were performed by the previous DH.	No effect, the dentist and the DH tried to create a new job for the DH with extended tasks, but this attempt failed because of the DH's individual factors.	No large effect, the dentist was willing to create a job for DH that fit the DH's competencies.	The owner and the DH created a new job together for this new style DH according to the DH's competencies.
Communication and negotiation about dental hygienist's job content and task division	Job content was negotiated at the beginning, and both the dentist and the DH were satisfied with the current DH's job content. The DH did not communicate desires for small changes with the dentist.	The DH preferred slightly different job content but was aware of dentist's clear view on DHs' job content in this practice. The DH accepted the situation as it was and did not communicate or negotiate.	The DH preferred more extended tasks but was aware of all difficulties: 1. dentist's clear view on DHs' job content in general 2. DH's small formation and 3. high periodontal care demands. For now, the DH accepted the situation as it was.	The dentist offered DH opportunity to expand the job content; after a while, they both agreed that a traditional role better suited this DH due to the DH's individual factors.	At the beginning, job content was negotiated. At the moment, both the dentist and the DH are satisfied with the current DH's job content. The DH desired small changes, but these were not communicated with the dentist.	Much communication between the owner and the DH due to the growing practice and searching for optimal work structuring. There was less communication between the dentist and the DH.

3.6 Contribution of individual factors: cross-case analysis

This section discusses the influence of individual factors of the dentist and dental hygienist and the interpersonal factors between these professionals on current task division, perceived job complexity and job satisfaction. First, however, we provide an overview of the changes between the two measurements in job content, perceived job characteristics and job satisfaction for the six dental hygienists in our cases. In some cases, the comparison between T1 and T2 was only possible on the individual level; because two respondents (from the Sweden and USA practices) were working in other practices at T2. Therefore, the comparison with the data from T1 was only suitable to gain insight into their career development. Appendix VI contains an overview of the participants' work situation at the two measurement moments and at the time of the interview.

Table 14 presents the dental hygienists' job content at T1 and T2 as well as the changes between T1 and T2. There was a slight change in job content in all cases, but the direction of the changes differed among the dental hygienists. Most changes in job content occurred in periodontology tasks, caries executive tasks and oral healthcare policy tasks. Four of the six participants performed more periodontology tasks, and two participants performed less periodontology tasks. Five of the six participants scored higher on caries executive tasks at T2 compared with T1. The only decline in performing these tasks was found in the participant from the USA case who started working at another practice at T2. Three of the five participants who were performing caries executive tasks more often at T2 were also more involved in caries decision making (Germany, Sweden and Switzerland). Participants from the Iceland and Switzerland practices were also performing more caries diagnosis and treatment planning at T2. It is interesting to note that an increase in caries executive tasks did not necessarily go together with an increase in decision making, diagnosis and treatment planning in caries patients. The participant from the Poland practice was performing more caries treatments but was less involved in decision making, diagnosis and treatment planning. The changes with the largest magnitude were found in oral healthcare policy tasks. Five of the six participants were more involved in oral healthcare policy tasks at T2. The lowest level of change was observed in prevention and extraction tasks.

In summary, we found numerous changes in job content among individual dental hygienists, but the changes were not in the same direction (i.e., we observed increases and decreases in frequencies of performing particular tasks). This could explain the non-significant difference in job content in our paired measurements among the new style group over a two-year period (Section 5.3.2). In five of the six cases, task division was task-based for the caries-related care and patient-based for the periodontal care. This indicates that in caries-related care, only single (mostly executive) operational tasks were being delegated to dental hygienists. In

periodontal care, however, the dental hygienists were responsible for the entire treatment, including diagnosis, treatment planning and the execution of treatments. The only exception was the Poland case. The task division in periodontal care in this practice was also task-based due to one specialized dentist in periodontal care (the owner) who performed the diagnosis and treatment planning.

Table 15 presents the perceived job characteristics and job satisfaction of our six participants at T1 and T2 as well as the change between T1 and T2. The observed changes differed in magnitude and direction. Interestingly, job satisfaction for the participants from the USA and Sweden practices increased at T2, but their overall perceived job complexity decreased. As mentioned, the dental hygienist from the USA case started working in another practice. Therefore, it is possible that, in these cases, contextual and personal factors have more influence on job satisfaction than perceived job complexity. Participants from both the Iceland and Switzerland practices, who scored the maximum job satisfaction at T1, perceived lower job satisfaction and job complexity at T2. Only the Poland participant reported increased job satisfaction and job complexity, which appeared to be due to more involvement in research activities and oral healthcare policy and higher perceived feedback. The negative relationship between the experienced role conflict and job satisfaction appeared to be consistent among these six dental hygienists. Three dental hygienists whose perceived role conflict increased at T2 perceived lower job satisfaction. Of the three dental hygienists who were more satisfied with their job at T2, two perceived lower role conflict, and one perceived the same amount of role conflict.

Table 14. Job content of the dental hygienist at T1 and change between T1 and T2 - Δ(T2-T1), mean scores for each task group

Case (n=6)	**IS**		**PL**		**DE**		**USA***		**SE***		**CH**	
Task group (mean)	T1	Δ	T1	Δ	T1	Δ	T1	Δ	T1	Δ	T1	Δ
Intake	3.50	0.50	5.00		2.50		3.00	-1.00	1.50		5.00	
Prevention	5.00		5.00		4.00		3.50	0.50	5.00		5.00	
Periodontology	4.57	-0.29	4.29	0.29	3.71	0.57	3.43	1.57	5.00	-0.29	4.43	0.57
Orthodontics	2.00	-0.25	1.75	-0.75	1.50	-0.25	1.25		1.00	0.50	2.00	-1.00
Local anesthesia	5.00		5.00		3.75	0.75	3.00	1.50	3.50	0.50	5.00	
Caries diagnosis and treatment planning	2.67	0.50	3.33	-0.17	3.33		2.67		4.50	-0.67	1.33	1.67
Caries decision making	1.71	-0.29	2.14	-0.29	3.57	0.14	1.00		2.14	1.00	1.00	1.14
Caries executive tasks	3.77	0.31	3.08	0.23	3.00	0.08	2.38	-1.08	1.62	1.38	3.38	0.15
Extraction	1.00		1.00		1.25	0.25	1.00	0.50	1.00		1.00	
Evidence-based practice	1.67	-0.33	2.67	0.67	2.00		2.67	0.67	3.33		2.67	-.33
Oral healthcare policy	1.00	1.50	2.50	1.25	2.00	2.00	1.75	0.25	1.00	2.00	4.00	
Scientific research	1.00		1.00	1.00	2.33	0.33	1.00	0.67	1.00		1.33	-0.33

- Task performed more often at T1.
* Data from another practice at T2.

Table 15. Job characteristics and job satisfaction of the dental hygienist at T1 and change between T1 and T2 - (Δ = T2-T1)

Case (n=6)	**IS**		**PL**		**DE**		**USA***		**SE***		**CH**	
Job characteristic scales (mean)	T1	Δ	T1	Δ	T1	Δ	T1	Δ	T1	Δ	T1	Δ
Skill variety	4.60	-0.40	2.60	-0.20	3.60	-0.20	4.00	-1.20	4.20	-0.20	4.60	
Task identity	4.40	-0.20	3.60	0.20	4.00	0.20	4.20	-0.60	4.60	-0.40	4.80	0.20
Task significance	5.00		3.50	0.25	4.00	0.25	3.50		5.00	-0.25	5.00	
Autonomy	5.00	-0.25	3.75	-0.25	4.00	-0.25	3.75	0.25	4.00		4.50	-0.50
Feedback from job	4.75	-1.00	3.00	0.75	3.50	0.25	3.75	-0.50	3.75		4.75	0.25
Job complexity	4.75	-0.37	3.29	0.15	3.82	0.05	3.84	-0.41	4.31	-0.17	4.73	-0.09
Role conflict and role ambiguity (mean)												
Role conflict	1.50	0.25	2.25	-0.25	2.50	0.25	3.00	-0.75	2.00		1.00	1.00
Role ambiguity	4.57	-0.57	3.57	0.29	3.86	0.14	3.86	0.29	4.00	-0.25	5.00	
Job satisfaction scales (mean)												
Intrinsic JS	5.00	-0.33	3.89	0.33	3.56	-0.44	2.67	0.89	3.89	0.44	5.00	-0.22
Extrinsic JS	4.00	1.00	4.00		3.50	-0.50	1.00	3.50	3.00	1.00	5.00	
Career satisfaction	5.00		3.00		4.00	-1.00	2.50	1.50	3.50	0.50	5.00	

- Score higher at T1.

* Data from another practice at T2.

Overall, we concluded that several changes in job content occurred, but the magnitude and direction of these changes were not the same. We observed dental hygienists with expanded or restricted job contents over a two-year period. Furthermore, the changes in job content did not always lead to changes in job complexity and job satisfaction, which is proposed in the JCM.

Societal and organizational factors alone cannot explain the variety in task division or resulting worker and patient satisfaction. To identify factors explaining the current task division and the resulting worker and patient satisfaction, we focused on the individual factors of dentists and dental hygienists and their interpersonal relationships because our main findings suggested that these factors play a major role in the organization of task division. Most variation in job content between the cases could be explained through the dentists' preferences, interactions between the dentists and the dental hygienists, and aspirations and competencies of the dental hygienists. This leads to a certain task division in a dental practice. First, we focused on the individual factors of both professionals (dentists and dental hygienists), and then we described the role of the interpersonal relationship between these professionals. The next factors are described in this section and analyzed for their possible influence.

- Individual factors - dentist:
  - General willingness to delegate tasks to other dental occupations
  - General willingness to supervise dental hygienists in their extended tasks
  - Dentists' personal views on task redistribution and oral healthcare in general
- Individual factors - dental hygienist:
  - Self-efficacy and competence in extended tasks
  - Dental hygienists' views on task redistribution and their professional accountability
  - Dental hygienists' expectations and experiences at other jobs
  - GNS
- Interpersonal factors – from the dentist's point of view:
  - Dentist's confidence in the dental hygienist
  - Dentist's appreciation of the dental hygienist
  - Dentist's view on the dental hygienist's competencies in extended tasks
  - Mutual trust

3.6.1 Individual factors - dentist

3.6.1.1 General willingness to delegate tasks to other dental occupations

The dentists, and one owner-dental hygienist, from our cases delegated tasks to dental hygienists for four reasons: to maintain dental hygienists skills in extended tasks, to keep dental hygienist satisfied, to support the developments in task redistribution and to optimally use skills and knowledge of all personnel. The dentist in the Sweden practice primarily delegated extended tasks because the dental hygienist was educated in these tasks, and the dentist felt responsible for the dental hygienist's maintenance of these skills and knowledge. The dentists from the Poland and Germany cases only needed their dental hygienists for periodontal treatments, but they occasionally delegated extended tasks to keep the dental hygienists satisfied. The dentist from the Iceland practice was looking for a dental hygienist for 18 months, and the shortage of dental hygienists motivated him to meet the dental hygienist's preferences for job content and to keep the dental hygienist satisfied. In the Switzerland case study, the dental hygienist (the owner) supported dental hygienists' expanded job content in general, whereas the USA practice has the policy of optimal use of their personnel because both owners believed that everybody should do what they can and/or are willing to learn. The dentist from the USA practice was willing to delegate periodontal surgery treatments to the dental hygienist if the dental hygienist was willing to learn.

Except for the Iceland case, all dentists in our study were willing to delegate more caries treatment tasks to their dental hygienists. The dentist from the Iceland practice stated that dental hygienist's job content *was expanded enough*. The dentists from the Germany and Poland cases were *not enthusiastic* about the delegation of caries treatment tasks to dental hygienists, but they were willing to do so to keep their dental hygienists satisfied. Only the dentist from the Sweden practice was willing to delegate more dental checkups to dental hygienists. Indeed, this dentist stated that it was safe to alternate dental checkups between the dentists and the dental hygienists. The dentists from the Iceland, USA and Switzerland cases had a strong view of the dentist having final responsibility for the patients, and they did not want to take this responsibility if they were to delegate dental checkups to dental hygienists. The dentists from the Poland and Germany practices found the extension of dental hygienists' scope of practice and the extension of their authority *absurd*.

In summary, all dentists were willing to delegate single operational tasks in caries treatment to dental hygienists, but only one was willing to delegate the dental checkups. Dentists expressed that having final responsibility in terms of being accountable for the patients was the major factor in wanting to retain the exclusive authority to make decisions in patients' care.

3.6.1.2 General willingness to supervise dental hygienists in their extended tasks

The dentists' willingness to supervise their dental hygienists in new tasks varied between practices. According to the dentist from the Sweden case, the supervision of new dental hygienists was not necessary (i.e., the dentist assumed that a graduated dental hygienist was capable of performing all extended tasks). The dentist from the Germany practice evaluated his own dental hygienist as very capable and did not feel that supervision was needed. Nevertheless, he acknowledged the need for supervision of new style dental hygienists based on his experiences with students doing internships in his practice. Dentists from both the Sweden and Germany case studies were always available and willing to provide supervision and feedback at the request of their dental hygienists.

The dentists from the USA and Switzerland practices found their dental hygienists to be too slow in performing caries treatments. According to these dentists, dental hygienists must perform numerous caries restorations in a short period of time. Only then can they develop the routine needed in extended caries tasks. Both dentists, however, were satisfied with the quality of the caries restorations performed by their dental hygienists. The dentist from the USA case was willing to spend half an hour per week, and the dentist from Switzerland would spend two days per year supervising and training dental hygienists in restorative tasks.

The dentists from the Poland and Iceland practices agreed that the supervision of new style dental hygienists was needed, and they both spent a great deal of time supervising their dental hygienists (i.e., three hours per week in Poland and 10-15% of the dental hygienists' working hours in the first year in Iceland). The dentist from the Poland case also supervised newly graduated dentists in his practice. Currently, both dentists provide less supervision because of their dental hygienists' growing experience. They are, however, always available and willing to provide supervision and feedback if requested.

The differences in supervision of dental hygienists and dentists' views on the need for supervision were substantial (statements varied from *no supervision is needed* to *constant supervision in caries treatments is required*). The dentists were generally satisfied with the quality of restorations but less satisfied in the quality of dental checkups performed by dental hygienists.

3.6.1.3 Dentists' personal views on task redistribution and oral healthcare in general

All dentists in our study agreed that the dentist should keep the final responsibility for the patients and the authority in care direction. Within the switch system, the dentists from the Iceland and USA cases would be willing to delegate more single tasks in caries preparation and restoration to dental hygienists if they could find a dental hygienist capable of this job. In this scenario, dental hygienists would not make caries diagnoses and treatment decisions on their own. The dentists from the

Poland and Germany practices primarily saw dental hygienists as specialists in periodontology, and they both had a strong opinion that the inclusion of caries tasks in dental hygienists' scope of practice was *absurd*. The dentists from the Sweden and Switzerland case studies did not find dental hygienists' task extension absurd, but they were concerned about the quality of care and wanted to examine their patients to take the responsibility for their oral health.

In conclusion, none of the dentists considered the scenario of the Committee on Innovation in Oral Healthcare to be possible. The dentists from the Iceland and USA practices agreed to delegate primary, secondary and tertiary prevention of caries and periodontitis for noncomplex patients to dental hygienists under the condition that the dentist directs the care and takes the final responsibility. The other four dentists did not agree with this scenario at all. The dentists from the Sweden and Switzerland cases were only concerned about the quality of care, but the dentists from the Poland and Germany cases thought that the committee's scenario *goes too far*.

3.6.2 Individual factors - dental hygienist

3.6.2.1 Self-efficacy and competence in extended tasks

All six dental hygienists from our cases were educated for the full scope of practice, but after two years of experience, only one of them felt fully confident about performing extended caries tasks. The other five participants were still insecure about their caries diagnosis and treatment competencies. We found a situation where dental hygienists find extended tasks difficult and require more time and supervision to perform these tasks (Figure 17). If they do not receive proper supervision and feedback, however, it takes even more time to get more experience, and they eventually become even more insecure about their competencies. The dental hygienist from the USA case completely stopped performing extended caries tasks and eventually quit his job due to a lack of competence, lack of supervision, and pressure to perform his job faster.

The low self-efficacy among dental hygienists affects task division because dental hygienists prefer performing less extended tasks where no help and supervision from dentists is needed. Moreover, low self-efficacy decreases dental hygienists' job satisfaction and eventually affects dental hygienists' views of their role in the team of dental professionals negatively (Figure 17).

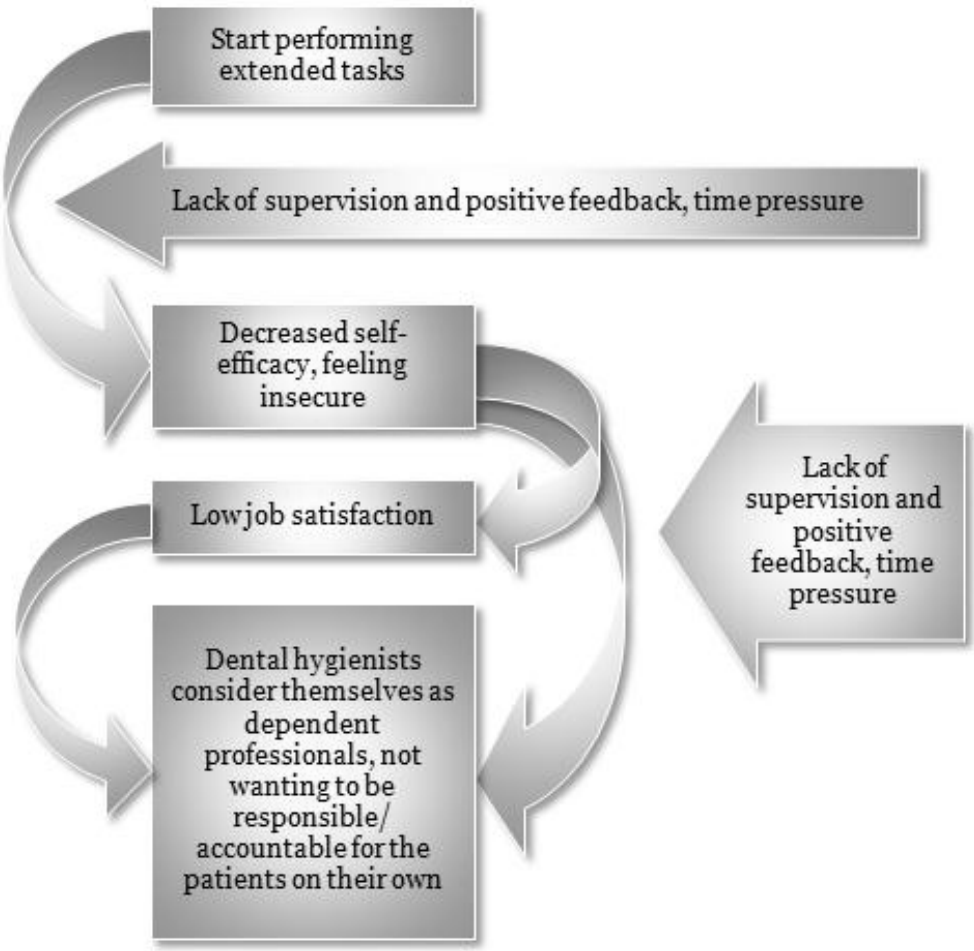


Figure 17. Dental hygienists experience a downward spiral in performing extended tasks

3.6.2.2 Dental hygienists' views on task redistribution and their professional accountability

Five of the six dental hygienists from our study did not consider themselves as an independent professional and did not want to be responsible/accountable for the patients on their own. Four of the six dental hygienists did not consider themselves competent enough to perform within the scenario of the Committee on Innovation in Oral Healthcare and did not want to have final responsibility for their patients. According to these four dental hygienists, patient care should be directed by dentists. Their ideal cooperation with the dentists would be one with clear dentist's direction and ample time for communication and consultation with the dentist. Only the dental hygienist from the Germany practice considered the ideal scenario of the Committee on Innovation in Oral Healthcare as possible and achievable. This

dental hygienist previously worked in oral healthcare as dental technician and he believed he was capable of functioning within the ideal scenario and was willing to take responsibility. He was concerned about the competencies in extended tasks of other new style dental hygienists, however, he hoped that dental hygiene education had improved since his graduation. The dental hygienist from the Switzerland case believed she was confident enough to function within the ideal scenario, but she was not fully convinced of the success of the scenario of the Committee on Innovation in Oral Healthcare because of dentists' ignorance of the new style dental hygienists' scope of practice.

Overall, four dental hygienists considered their profession as a type of specialist in prevention and periodontology and the dentist as the director of total patient care. Two dental hygienists were convinced that *all* patients should always visit the dentist *and* the dental hygienist. These two hygienists believed that optimal care was only guaranteed when the decisions and the responsibilities were taken by both professionals.

Dental hygienists' views on their role in oral healthcare clearly affect their job content because they do not desire jobs with too much patient responsibility.

3.6.2.3 Dental hygienists' expectations and experiences at other jobs

Dental hygienists' roles at other jobs and social comparisons with the roles of other dental hygienists also influence their preferences in job content, experienced job characteristics and job satisfaction (Figure 18). All of our participants worked in two or more practices, and they provided examples about how they experienced the differences. The participant from the Poland case worked as the only dental hygienist in another practice. In the other practice, she had a more extended job content and more responsibility compared with her job in the Poland practice. She compensated for her less extended job content in the Poland practice by being able to consult with colleagues. The dental hygienist from the Switzerland case chose a *combination of jobs at all times* because of task variety. At her other job, she had far more extended job content and autonomy (i.e., she performed dental checkups and caries diagnosis and treatment on a regular basis). Initially, she preferred the same job content in the Switzerland practice, but based on her experience in the Switzerland practice and the cooperation with the dentist in the Switzerland practice, she realized that she had too much responsibility at her other job. Eventually, she readjusted her expectations for her job in the Switzerland practice. For the Germany case study participant, the differences between his two jobs were so large that he eventually chose to leave the Germany practice and start his own practice within the practice of his second employer. For the participant from the USA case, the different experiences at his two jobs led to his decision to stop performing caries-related tasks and focus solely on traditional job content. In the USA practice, he received negative feedback on his performance in extended tasks,

but he felt more appreciated for his competencies in periodontal treatments at his job in a dental hygiene practice.

Based on these findings, we concluded that the dental hygienists' expectations and experiences at one job influenced their job content, experienced job complexity and job satisfaction at their other job(s).

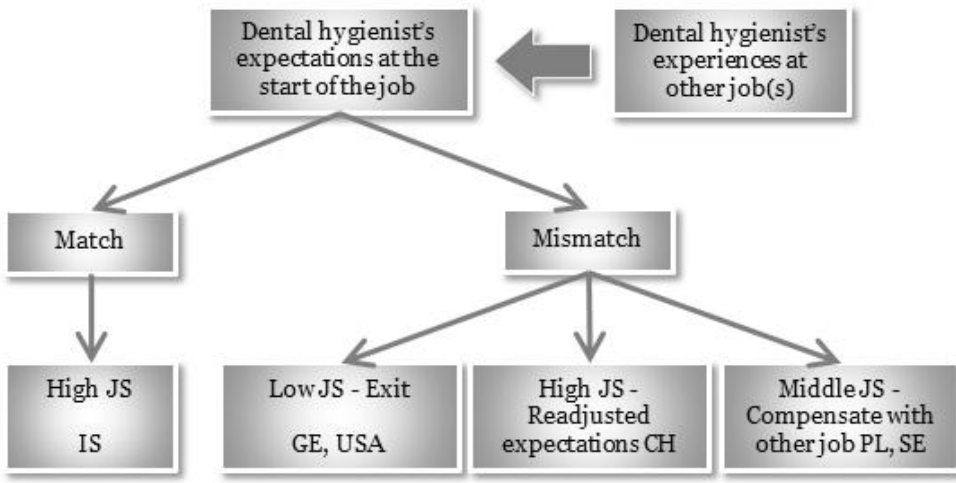


Figure 18. Dental hygienists' expectations: the match with the current job content in relation to job satisfaction and different ways to deal with mismatches

3.6.2.4 GNS

Only two of the six dental hygienists from our cases scored relatively high on GNS: the dental hygienists from the Germany and Switzerland practices. In the discussions with these two dental hygienists, we observed that they had a proactive attitude in designing their jobs. They were not satisfied with only performing traditional tasks in their job content and had a positive view on the future regarding task redistribution in oral healthcare. The other dental hygienists with low GNS scores were less sure about *the ideal scenario* and less prepared to take final responsibility/accountability for their patients.

In conclusion, regarding to the personal factors of dental hygienists, we found that dental hygienists have low self-efficacy in extended tasks, which affects their view on their role in oral healthcare and eventually affects their job satisfaction. Dental hygienists with low GNS scores were not willing to act according to the ideal scenario of the Committee on Innovation in Oral Healthcare. Ultimately, dental hygienists' own expectations and experiences seem to have the greatest effect on their job content and job satisfaction. The dental hygienists' comparisons between job experiences have led them to make changes in their own job content and even change jobs.

3.6.3 Interaction between dentist and dental hygienist

In Section 3.5.5, we discussed some aspects of the communication between the dentists and dental hygienists concerning dental hygienists' job content and task division in the organization. The present section focused more on the interrelationship between both professionals.

When asked for a reaction to the three aspects of task delegation, all six dentists and dental hygienists from our cases agreed that the following three aspects reported in the literature (Faltin & Hoogstraten, 2000) played a role in task delegation: a dentist's perception of a dental hygienist's competence, trust and a dentist's appreciation for the dental hygienist. We did not observe a lack of mutual trust in any of the case studies.

Five of the six dentists have had positive experiences in their cooperation with dental hygienists. Only the dentist from the USA practice reported negative experiences with dental hygienists. Indeed, he mentioned that it is impossible to work together with dental hygienists because they are *stubborn, do not listen and go their own way*. The dentists from the Poland, Germany, Sweden and Switzerland practices mentioned the very important and hard work of dental hygienists in periodontal care, and the dentists from Poland and Sweden were very appreciative of their dental hygienists' work in prevention and periodontology. The dental hygienist from the Sweden case reported experiencing the dentist's appreciation and confidence, which positively influenced dental hygienist's job satisfaction.

Dentists' perceptions of dental hygienists' competence seemed to be the most important factor for dentists to delegate tasks to dental hygienists in our cases. For all six dentists, this was the basis for their decision to delegate a task/patient to a dental hygienist. In addition, hygienist competency was an important factor in whether a dentist would allow the hygienist to take over for him/her if they could not treat patients for one day. We also asked dental hygienists if they could predict what their dentists answered.

Dental hygienists and dentists only agreed in two cases: Sweden and Switzerland. In the Sweden practice, the dentist would definitely allow the dental hygienist to treat her patients, and this even occurred once. In the Switzerland case, the dental hygienist was certain that the dentist would not let her treat the dentists' patients, and she was right. The dentist mentioned the dental hygienist's lack of knowledge and skills necessary to perform dental checkups as the reason for not letting the dental hygienist treat the patients.

The dentists from the Iceland and Germany practices were willing to trust the dental hygienists to treat their patients for one day, but the dentist from Germany was not enthusiastic about this task division based on his general view of the task redistribution between dentists and dental hygienists. Both dental hygienists from

the Iceland and Germany case, however, were not sure if their dentists would let them treat the patients. The dentist from the USA practice would also trust his dental hygienist to take his work for one day, but he would never let this occur because he promised that all patients would be treated by dentists. The dental hygienist from the USA case did not know if his dentist would trust him to take his work, but in any event, the dental hygienist stated that he did not want to perform this job based on his previous experience in extended tasks. A clear difference in the answers between the dentist and the dental hygienist was found in the Poland practice. This dentist would not trust his dental hygienist to act as proposed in our hypothetical scenario due to her lack of experience, but the dental hygienist thought he would trust her to do so.

In summary, the two dentists from the Poland and Switzerland case studies were clearly not willing to delegate their tasks for one day, the two dentists from the Germany and USA practices were slightly willing and the two dentists from the Iceland and Sweden cases were definitely willing to let dental hygienists taking care of their patients. In all cases except for Switzerland, the findings with regard to this hypothetical scenario were consistent with the dental hygienist's job content. In cases where dentists were willing to delegate their patients to dental hygienists for one day, we observed more extensive job content. Based on these findings, we concluded that confidence in a dental hygienist's competence is the most important factor for dentists to delegate tasks to dental hygienists.

Moreover, the interaction between an employer and a dental hygienist is also crucial for the hygienist's current job content, experienced job complexity and a positive view of the future. In general, we found that open communication between parties where everything could be discussed and the dental hygienist felt involved in the task division considerations resulted in a more positive view on the future of the organization and the practice as whole (e.g., in the Iceland, Sweden and Switzerland practices). The positive experiences were projected to the future view independent of the type and amount of task delegation to the dental hygienist. The dental hygienists from the Poland, Germany and USA cases were aware of the strong views of their respective dentists on future task division, and they felt that they could not contribute to any changes in the practice. Therefore, they had a negative view of the future task division in this practice.

3.6.4 Conclusion

Based on previous Dutch research (Faltin & Hoogstraten, 2002), the individual and interpersonal factors explain most of the variation in task division in our cases. All three aspects (individual factors of dentists and dental hygienists and interpersonal relationships) significantly influence task division and job satisfaction.

The strongest influence on task division in our study stemmed from the dentists' views on task redistribution in oral healthcare and dentists' corresponding views on

the dentists' final responsibility for the care provided. All six dentists agreed that the dentist should be the entry point of the care and bear ultimate responsibility. The dentists differed in their view of the role of dental hygienists in oral healthcare with regard to their job content. To some extent, four dentists supported the expansion of dental hygienists' job content, which makes them more willing to delegate tasks. In addition, the willingness of the dentists to supervise dental hygienists was related to their interpersonal relationships and had less direct influence on task division.

Task division and the willingness of dentists to delegate tasks were affected by interpersonal relationships and, more specifically, by the dentists' views on dental hygienists' competencies (Figure 19). All dentists were, to some extent, willing to delegate caries treatments to dental hygienists, but they were generally less willing to delegate dental checkups because they were not certain about dental hygienists' competence in performing these tasks. Other interpersonal factors, such as mutual trust, confidence, and appreciation for dental hygienists, were defined as a precondition for cooperation between dentists and dental hygienists, but these factors seemed to have less direct influence on task division and more influence on the job satisfaction of dental hygienists.

With regard to the individual factors of dental hygienists, low self-efficacy in extended tasks was found among dental hygienists, which agreed with the dentists' low perceived competence of dental hygienists' to perform these tasks. Five of six dental hygienists from our cases did not feel competent to perform all extended tasks, and in the four participants with low GNS, this lack of confidence also affected their view on the dental hygienists' role in oral healthcare (Figure 19). Indeed, the four dental hygienists with low GNS did not prefer the role of dental hygienists in the scenario of the Committee on Innovation in Oral Healthcare. Views on task redistribution, dental hygienists' competence, and dentists' and dental hygienists' ideas of ideal cooperation are presented in Table 16. We observed that all dentists and dental hygienists were concerned about dental hygienists' competencies to some extent, and this was the second most common reason (after dentists' authority issues) for not agreeing with the ideal scenario of the Committee on Innovation in Oral Healthcare. In summary, none of the dental hygienists considered the dental hygienist as the entry point in oral healthcare. In addition, dental hygienists preferred to perform dental checkups, but they did not prefer having the final responsibility for the patients. They liked working together with the dentists, and a kind of *shared responsibility* was a possible solution for these dental hygienists when performing dental checkups.

Compared with the dental hygienists' self-efficacy, dental hygienists' expectations and experiences at other jobs have less influence on task division; however, these expectations and experiences play a significant role in dental hygienists' perceived job characteristics and job satisfaction. Dental hygienists are willing to make concessions in their scope of practice in exchange for other work environment

factors that positively affect their job satisfaction, such as more colleagues and good interpersonal relationships.

Growth need strength does not influence job content directly, but it is related to the negotiation attitude of dental hygienists in defining job content. Dental hygienists with high GNS seek opportunities to discuss the current job content. In addition, GNS is also related to how dental hygienists view their role in oral healthcare. Interestingly, GNS may have more influence on the dental hygienists' job satisfaction and career development than job content. Decisions for leaving jobs and for further career development are based on the GNS and how well a dental hygienist's capacities fit with the current job content.

In conclusion, we found that dental hygienists' perceived job characteristics and job satisfaction are primarily affected by the extent to which their competencies fit the current job content and interpersonal factors, such as appreciation and confidence. We found that dental hygienists being confident about their own performance in extended tasks, feeling appreciated and being involved in task division increases job satisfaction.

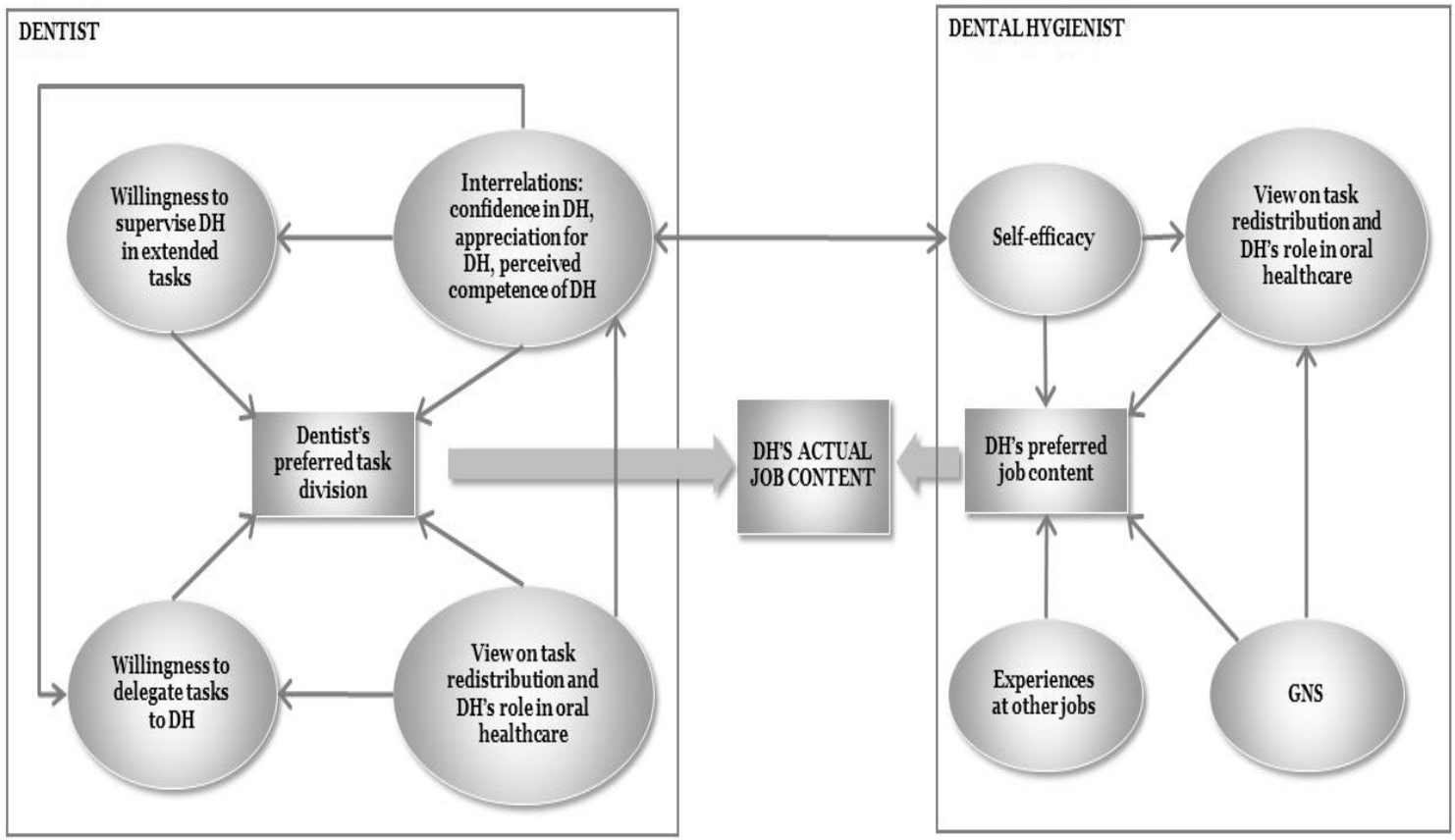


Figure 19. Individual and interpersonal factors affecting dental hygienists' job content

Table 16. Professionals' views on the ideal scenario of the Committee on Innovation in Oral Healthcare, their personal ideal cooperation and views on dental hygienists' competence to perform within this scenario

Case	Prof	View on dental hygienists' education and competence	View on ideal cooperation between dental hygienist and dentist	View on the ideal scenario of the Committee on Innovation in Oral Healthcare
Iceland	Dental hygienist	The DH's view on this is not clear. In the DH's opinion, the dentist should keep the authority.	DH getting clear orders from the dentist and room for immediate consultation. In the future, she would like to perform dental checkups, but only in patients with stable dental health.	*I think this is such a great responsibility. …I have my doubts because the dentist has the final responsibility for the whole treatment and a DH is a part of the whole patient's treatment. …I find it difficult to picture the DH indicating the care needed and referring back to the dentist. I find it odd.*
	Dentist	The dentist finds his current DH not capable to perform within the ideal scenario. His view on DHs' education and competencies in general is not clear.	He sees a role for DHs in the switch system together with the PA; dentist is working simultaneously on more dentist chairs, and partial tasks are delegated either to a DH or a PA.	"*Working on it*". If he could find a DH capable to perform within this scenario, he would consider this. However, he is still going to perform all dental checkups because he is the one to indicate what care is needed.

Case	Prof	View on dental hygienists' education and competence	View on ideal cooperation between dental hygienist and dentist	View on the ideal scenario of the Committee on Innovation in Oral Healthcare
Poland	Dental hygienist	Not sure that DHs could make the same quality fillings as dentists.	A lot of consultation between each other. The DH would participate in treatment planning and task division, even for tasks such as fillings and dental checkups. Dentists must have more confidence in DHs to delegate more tasks.	*I think this goes too far. There has to be something left for the higher educated professional.* This DH would not like to perform within this scenario due to too much responsibility for the patients.
	Dentist	*The existence of independent DH practices is a bad development because the quality of periodontology work is low. These DHs are not critical enough, and they prefer not to refer patients to the periodontologist because of the income loss. They are going to drill, too, those independent DHs! That is impossible. I think the quality…it is completely…the quality is lost.*	One central person with a lot of theoretical knowledge for diagnoses and referrals of patients to the other professionals. All patients would visit this 'diagnosis doctor' once every 1.5 years for a dental checkup.	This scenario is impossible; it has to be the other way around. Thus, the DH acts as a specialist and not the first line of the care.

Case	Prof	View on dental hygienists' education and competence	View on ideal cooperation between dental hygienist and dentist	View on the ideal scenario of the Committee on Innovation in Oral Healthcare
Germany	Dental hygienist	*The DH's competence should not be based on the DH's diploma; it has to be evaluated individually. Many DHs do not deserve to call themselves a DH.* He is concerned about the care quality in the future.	*One to one relationship, with no level/height differences, being free to share your views. Yes, you have to get along with each other because you are together treating the patient.*	*I think this is possible, this is definitely possible. Yes, why not? Many old fashioned dentists and dental schools have to change their views. I think that the four-year educated DHs expect this, but I wonder if dentists will go along with this plan.*
	Dentist	*I have an impression that the average DH does not know a much about occlusion and articulation. Yes, I think if you want to do dental checkups you have to know that stuff. I find it absurd that they may make fillings without knowing anything about endodontology.*	Large dental practice with one central person for coordination and management of many specialists in the practice. The DH would be one of those specialists.	*I absolutely disagree!* He sees the DH in the second line of care as a kind of specialist in periodontology.

Case	Prof	View on dental hygienists' education and competence	View on ideal cooperation between dental hygienist and dentist	View on the ideal scenario of the Committee on Innovation in Oral Healthcare
USA	Dental hygienist	DHs lack the competence to perform care at a high level. Caries treatments are a small part of the curriculum, but many DHs experience this part of the job as more important and more valuable.	Clear role division; the dentist refers patients to the DH who is acting as a kind of specialist in periodontology.	*This goes completely wrong*. This is due to the lack of dental hygienists' competence.
	Dentist	The quality of the periodontal care is good. The quality of the restorative work is also good, but the speed is low. This dentist cannot optimally use the skills of the new style DH because of a lack of experience in restorative work.	Already present in the current task division. In the future, a DH could possibly work with two patients simultaneously, and the dentist would be accessible to solve the complications in patient treatments.	*Good of course. It does not matter who does what, just if it's done well.* The dentist would not delegate the responsibility and decision making to the DHs. This scenario is possible in his practice, but not until 2018. In addition, the patients' perception has to change because patients are used to going to the dentist.

Case	Prof	View on dental hygienists' education and competence	View on ideal cooperation between dental hygienist and dentist	View on the ideal scenario of the Committee on Innovation in Oral Healthcare
Sweden	Dental hygienist	Some doubts. DHs learn to perform caries diagnosis and treatments, but if they do not maintain these skills, their competence decreases.	The cooperation with ample consultations on patient treatments, the dentist's confidence in the DH and feeling comfortable are preconditions.	Some doubts; DHs could perform within this scenario, but only if they maintain all of their knowledge and skills.
	Dentist	The dentist observed some mistakes in dental checkups performed by DHs, and she has some doubts about DH education. She is not convinced that DHs are able to perform proper screening because they lack knowledge.	Already achieved: *In the beginning I had some difficulties in giving away and delegating the tasks. I got used to it, however, and now I like it very much. That being said, I do not feel I should go even further with this.*	This scenario goes beyond the DH's scope of practice and would be irresponsible. She does not find this to be safe.

Case	Prof	View on dental hygienists' education and competence	View on ideal cooperation between dental hygienist and dentist	View on the ideal scenario of the Committee on Innovation in Oral Healthcare
Switzerland	Dental hygienist	Some doubts; the DH hopes that DH education has improved compared with her education 2 years ago. DH need to concentrate more on knowledge and skills in performing dental checkups.	Current cooperation is close to ideal: a good relationship with the dentist, open to each other, equal to each other and the rest *will be fine*.	Not possible in 2012, but she sees task distribution as a positive development. In the future, she sees patients going to the DH first and then dentists specializing in particular fields. Precondition: dentists must become aware of DHs competencies; otherwise, there is no chance for task distribution to occur.
	The owner (dental hygienist)	DHs are not competent enough to perform dental checkups. The education does not prepare DHs to perform all extended tasks well.	All patients must visit the dentist and the DH regularly. Only then can full preventive care be guaranteed.	Not achievable in such a short time. The owner is concerned about DHs referring patients to the dentists after it is too late because of their lack of knowledge. DHs have a reputation of professionals focused on prevention and periodontology, and dentists still hire DHs solely for those tasks. The owner sees dentists as professionals with authority to make final decisions.
	Dentist	This dentist is not convinced that this DH could perform within the ideal scenario due to a lack of experience in caries diagnosis and treatments. It is not clear how she thinks about DH education in general.	As it is now, only with far more DHs and Pas so that I can delegate more tasks.	*In this case, I am very greedy. I have to see the patients to take full responsibility for their mouth. If my dental hygienist or prophylaxis assistant is very good at his/her job, I want to see the patient once in a while.*

3.7 Discussion

We investigated the societal, organizational and individual factors that contribute to dentists delegating tasks to dental hygienists, and we investigated the satisfaction with the resulting task division of workers and patients. We discovered that changes in education and legislation within the societal context have only had a limited effect on task division in dental practices. Another societal factor, cultural mandate, has indirectly influenced task division through dentists' and dental hygienists' individual views on oral healthcare in general and their individual actions to create a desired task division. We identified a mix of organizational and individual factors that explained the task division in practices: dentists' and dental hygienists' formations and the care demands in practice, on one side, and the individual factors in terms of dental hygienists' self-efficacy and dentists' views on task division and the role of dental hygienists within the dental team on the other side. Because we primarily examined relatively small dental practices that were owned and managed by one or two dentists who individually decided on the practice organization, we concluded that the major factor for task division in the practices were dentists' individual factors (i.e., dentists' general views on task division in oral healthcare and their interpersonal relationships with dental hygienists).

The current task division between dentists and new style dental hygienists is far from the government's envisioned scenario, which is demonstrated in both our quantitative and qualitative data. We found that the job content of dental hygienists matched the dental hygienists' competencies and offered job complexity (Hackman & Oldham, 1980); however, this only applies to those tasks that were not threatening dentists' authority, which is supported by Abbotts' theory of professions (1988). We only observed task-based shifting of extended caries tasks and patient-based task delegation of tasks in diagnosis and treatment of periodontal diseases. Other recent studies have also shown little, if any, task shifting to dental hygienists and more task shifting to prophylaxis assistants (Van der Kwartel & Bloemendaal, 2009; Capaciteitsorgaan, 2010).

There are several explanations for the current task division in Dutch oral healthcare. Below, we explain factors that influence the current task division and possible interactions between those factors.

The introduction of task redistribution was meant to be a way to solve capacity issues, and offering dental hygienists the education and legitimacy to repair small caries lesions would increase oral healthcare efficiency. Although the plans in task redistribution on the level on professions were carefully thought out, the influences of several organizational and individual factors were not adequately considered. In the first step, we discovered that the next organizational preconditions were not fulfilled to make it possible for a dental hygienist to perform extended tasks (i.e.,

room in dental hygienist's formation, need for supervision, need for an assistant in performing the extended tasks and changes in practice equipment). The combination of high demands in periodontal care and low dental hygienists' formation per practice are the most important organizational factors influencing task division.

At the individual level, we discovered that dental hygienists did not perform the extended tasks often enough to develop expertise. In addition to high periodontal care demands, the care demands in patients with caries also affect the extent to which dental hygienists perform extended tasks on a regular basis. Several patient-related aspects were identified in our cases. For example, patients with several caries lesions, of which only one or two can be treated by a dental hygienist, are not referred to dental hygienists because of the continuity in treatment. In addition, children with caries are not referred to dental hygienists because they cannot place restorations quick enough. Moreover, a large number of caries are secondary caries, which are not suitable for dental hygienists. Furthermore, some dentists repair small caries lesions immediately after the dental checkup, and referring these patients to a dental hygienist would lead to an extra appointment for the patient.

Most reasons for current task division not resembling the policy makers' ideal scenario are related to a lack of dental hygienists' competence, as reflected in dental hygienists' low self-efficacy and dentists' low trust in dental hygienists' competence. Dentists' views on the competency of dental hygienists are especially important because this aspect is closely related to dentists' views of the final authority in oral healthcare. According to their own saying, the dentists are striving to maintain the authority due to their low confidence in dental hygienists' competence. It is unclear to what extent increased dental hygienists' competence would affect the way dentists view the role of dental hygienists in oral healthcare and the division of authority.

Related to the competency of dental hygienists and dentists' expectations of the competency of dental hygienists, we argue the importance of the Pygmalion effect, as introduced within the concept of self-fulfilling prophecy. The Pygmalion effect refers to the effects of interpersonal expectations in which one person's expectations of another can come to serve as a self-fulfilling prophecy (Rosenthal, 2010). Based on the findings that raising teachers' expectations enhances pupil performance, we argue that a similar interpersonal relationship between dentists and dental hygienists is possible (i.e., raising dentists' expectations will increase dental hygienists' performances). The positive effect of managers' expectations of subordinates has already been reported in several studies (Eden, 2009). Eden (2009) even sees the Pygmalion effect as the most effective and cost-saving approach to increase motivation in work organizations. Based on the findings from our cases we conclude that for the time being the self-fulfilling prophesy develops in an opposite direction.

Our study reveals that dental hygienists' views on dentists' legitimate authority tend to converge with the dentists' own views. Dental hygienists do desire an expanded scope of practice, but they do not desire greater responsibility and more authority. They also see the dentist as the primary care provider. Interestingly, individual dental hygienists are not actively fighting for the expansion of their authority; they tend to adapt to the current work structuring in dental practices. In developing their view on oral healthcare and in taking a position as a professional within a practice among other professionals, recently graduated new style dental hygienists are affected by their experiences and interpersonal relationships in all work settings. Interestingly, we discovered that dental hygienists with high self-efficacy and high GNS are less accommodating to the current work structuring in the organizations and to the dentists' views on oral healthcare in general. Therefore, we concluded that new style dental hygienists with low self-efficacy and low GNS are less proactive in crafting their jobs and searching for their own views on oral healthcare; thus, they are more strongly subject to the influences of the present work structure and interpersonal relationships at their jobs. The literature also reports that interpersonal relations influence the proactive attitude (Parker, Bindl & Strauss, 2010). Moreover, a decrease in perceived professional autonomy in multidisciplinary teams depends among others on the quality of interpersonal relations (Molleman, Broekhuis, Stoffels & Jaspers, 2008).

Most dental hygienists had multiple jobs, which also affected the extension of task division. Indeed, the literature shows that part-time employment of dental hygienists negatively influences task delegation (Chapko et al., 1985; Bruers et al., 2003). We also found this to be true in the present study. Dental hygienists work too few hours per week per practice to perform extended tasks other than their core tasks in periodontal care. If dental hygienists continue to choose part-time jobs and combine more jobs, then there will be little or no progress in the development of task redistribution because of periodontal care demands.

For the organizations, there are no financial incentives to delegate extended tasks to dental hygienists. In terms of efficiency, more profit is expected through task distribution to prophylaxis assistants for several reasons. Firstly, the remuneration of dental hygienists is higher than of prophylaxis assistants. Secondly, dental hygienists need an assistant to perform extended tasks, which brings more costs in the form of human resources in a practice and introduces an additional problem in the planning and organization of the work. Thirdly, dental hygienists' speed in performing extended tasks is low. In the same amount of time, they could do much more periodontal work.

Having explained the influence and the interaction between key factors on the current task division, we next focus on the question of how these findings can be explained by existing theories. More specifically, in what respect can our findings question or add/support existing theories? We attempted to place our findings within the JCM and Abbott's system of professions theories.

The government and the education system are implicitly leaning on Hackman and Oldham's idea that job satisfaction increases by bringing more job complexity to dental hygienists' jobs by adding new tasks and new responsibilities in their scope of practice. Our finding that the current task division does not represent the ideal scenario does not necessarily mean that the new style dental hygienists perceive low job complexity and low job satisfaction. We observed that the optimal job complexity for a dental hygienist is one that fits the dental hygienist's competencies. In the case where the job complexity exceeded the dental hygienist's competencies, job satisfaction eventually decreased, which indicates a saturation point in job complexity. In another case we saw that dental hygienists feel capable of performing the full scope of practice, but they experience low job satisfaction because they do not get any opportunities to perform the expanded tasks. In either scenario, the mismatch between the job demands in terms of job complexity and dental hygienists' competencies may result in low job satisfaction.

The Job Characteristics Theory, which was primarily developed as a model of task motivation, can also be viewed from the perspective of a person-environment fit (Kulik, Oldman & Hackman, 1987). Three characteristics of people are identified in the JCM as important in determining a fit between job complexity and the job holder: knowledge and skills, GNS and context satisfaction. Dental hygienists' competencies could be interpreted in terms of workers' knowledge and skills, which is included in the JCM as one of the moderators of the relationship between job complexity and job satisfaction. Persons with sufficient knowledge and skills will experience jobs with high complexity more positively compared with individuals with inadequate knowledge and skills involved in jobs with high complexity. Indeed, the latter individuals experience frustrations and unhappiness at work due to their feelings of being unable to effectively perform their jobs. To avoid the constant pain of failure, these latter workers may opt to leave a job or convince themselves that they do not care for the work (Kulik et al., 1987). The dental hygienist from the USA case study is a good example of this kind of behavior. At first, when he was convinced he lacked knowledge and skills in extended tasks, he started to consider that part of his job as less important. This dental hygienist even complained about dental hygienists perceiving these extended tasks as more important compared with the traditional job content. Eventually he left his job.

With regard to the three moderators in the JCM, Kulik et al. (1987) stressed that only sufficiently competent people with high GNS who are relatively satisfied with their work context are predicted to prosper in very complex jobs. Workers with inadequate knowledge and skills, low GNS and low work context satisfaction will not experience positive outcomes, even in highly complex jobs. The effect of knowledge and skills on how workers' respond to jobs with high job complexity in relation to the JCM, however, has never been studied. Although, we have not measured knowledge and skills of dental hygienists, we discovered that low self-

efficacy among new style dental hygienists influences their job satisfaction. In addition, this low self-efficacy also influences their job content.

Concerning dentists' own job complexity, we wondered if a higher job complexity always leads to greater job satisfaction (in terms of the JCM). According to the Committee on Innovation in Oral Healthcare, dentists' desire to create more room for themselves to concentrate on more complex tasks has been an additional reason for the introduction of the dental hygienists' extended scope of practice. Other literature also suggests that greater task delegation would lead to more satisfied dental hygienists and relieved dentists (Christensen, 1995). Interestingly, we did not observe this dynamic in our cases. Similar to dental hygienists, dentists also want varied job content and not just jobs with complex tasks (Abelsen et al., 2008). Although the dentists in the present case studies did not feel relieved by delegating extended tasks to dental hygienists, they did feel relieved by delegating more dental hygiene work to either a dental hygienist or a prophylaxis assistant. It may be that dentists do not want greater job complexity; they are satisfied with their job content and delegate extended tasks to dental hygienists only if delegating these tasks brings no additional workload in work structuring.

The assessment of job complexity and job satisfaction presented in the JCM is based on a single job. We discovered, however, that the experiences, interpersonal relationships and work environment factors at other jobs influence the overall job complexity and job satisfaction of the assessed job. Moreover, the experiences and interpersonal relationships at different jobs influence dental hygienists' views on oral healthcare in general. Dental hygienists make concessions between more jobs in terms of job content, interpersonal relationships and work environment. The main reason for dental hygienists to combine jobs is to increase their overall skill variety by working in different practices. In conclusion, when assessing job complexity and job satisfaction at a single job, one should take into account the experiences, interpersonal relationships and work environment factors of other jobs to assess the exact amount of job complexity and job satisfaction perceived in a single job.

The interpersonal relationships between dentists and dental hygienists are interpreted in terms of Abbott's system of professions (1988). Concerning Abbott's fight over jurisdiction between professions, we were surprised to find that dental hygienists' views on dentists' legitimate authority were in line with the dentists' views. The similar views of dentists and dental hygienists on the important issues of jurisdiction and dentists' authority reveals a different dynamic within an organization compared with macro-level dynamics between professional associations and other stakeholders. This different dynamics at meso and macro level addresses the gap in Abbott's approach, which had previously been identified (Section 3.1). According to Abbott, workers tend to adapt to a workplace, which results in different interprofessional relationships at the meso level compared with relationships on the macro level (Bureau & Suquet, 2009).

A similar mechanism in the interprofessional relationship between dentists and dental hygienists and the relationship between dental hygienists and prophylaxis assistants was found in our study. Indeed, both the dentists and the dental hygienists were not willing to delegate tasks to the lower profession/occupation because of their low confidence in the competence of the subordinate occupation. The main reason for not willing to delegate tasks, however, was different for the dentists and the dental hygienists. Dentists are striving to maintain their authority in the relationship with dental hygienists, whereas dental hygienists from our cases were primarily striving to maintain their skill variety and were less concerned about losing authority.

In terms of Abbott, dental hygienists' lower concerns of losing authority to prophylaxis assistants may be due to the different ferelationship with the prophylaxis assistants, which is not considered a profession. A second explanation would be that dental hygienists simply do not seek authority. As we mentioned earlier in this section, dental hygienists want expanded job content, but they do not desire more authority in terms of higher responsibilities and accountability for the overall oral health of patients. The question remains, however, as to how we place dental hygienists' views on oral healthcare and their role within a dental team of professionals in the professionalization process of dental hygiene. It seems that their view does not fit some of the core characteristics of a profession. We have identified two explanations why dental hygienists do not strive for more authority. First, a kind of objectivism occurred (i.e., dentists are those directing the care processes and there is no doubt about it). Secondly, dental hygienists are well aware interprofessional relationships and fight for authority between dentists and dental hygienists on the macro level, but this does not lead to significant agency because of the low self-efficacy of the individual new-style dental hygienist; dental hygienists willingly take an underdog position. We expect that the new style dental hygienists would adapt their views on oral healthcare organization and develop a desire for more authority by gaining more experience.

According to socialization theory (Sewell, 1963; Schein, 1971), we can state that each recently graduated dental hygienist goes through a socialization process. The extent to which this professional socialization is affected by the organization and interpersonal relationships varies between individuals and, more importantly, between professions. We argue that professional socialization of a newly graduated professional in more established or dominant professions (e.g., doctors, dentists, physiotherapists) is easier because of more objectified dominance compared with professions striving for their professional status (e.g., nurse practitioners and dental hygienists), which was previously described by Lurie (1981).

Among several studies on task division between the dentists and the dental hygienists in the Netherlands, our study was the first to focus on the dental hygienist profession. Moreover, the present study was the first to measure the effects of task redistribution on oral healthcare workers' job satisfaction. One

disadvantage of our study is that we did not succeed in selecting a case with task division close to the ideal scenario; however, from the survey (Chapter 5) we may conclude that those practices rarely exist. Without cases that modeled the ideal scenario, we could not directly assess the success factors for the ideal cooperation according to the scenario of the Committee on Innovation in Oral Healthcare; however, we identified several factors that could be affected in such a manner that the ideal scenario would be achievable. Data triangulation was obtained because of mixed methods in data collection, which was the main advantage of our study. We managed to compare the views and experiences of dentists and dental hygienists in the same practices to gain insight into the total mix of organizational, individual and interpersonal factors.

3.8 Conclusion

Changes in education and legislation alone are not enough for fundamental changes in work structuring between dentists and dental hygienists. The contribution of interrelated organizational and individual factors has been neglected in the literature, but our study demonstrated that interrelated organizational and individual factors are far more important than expected. The view on task and authority division between different professionals in oral healthcare is a determinant of current work structuring.

In addition, factors such as dentists' and patients' lack of information about dental hygienists' extended capabilities suggest that the work field was not ready for the arrival of new style dental hygienists. The level of current task division that is due to factors related to the novelty of the situation remains unknown. We expect that more effort spent in promoting the dental hygienists' new scope of practice will have some results in increasing the task redistribution between dentists and dental hygienists. However, in our view, to predict the task redistribution in the future, we should take the most important factors into account: 1) individual factors in terms of dentists' personal views on task division and oral healthcare in general, and dental hygienists self-efficacy and their view on the oral healthcare; and 2) the combination of two organizational factors - periodontal care demands and dental hygienists formations.

With regard to the level of analysis, we discovered that experiences at other job(s) had a significant influence on the assessment of job complexity and job satisfaction in a single job. It follows that the unit of analysis in JCM should probably be the individual across jobs /roles the person fulfills. Furthermore, we argue that knowledge and skills, which is a moderator in the JCM, has a far more important effect than expected, and the role of this moderator should be the subject of future studies on the JCM. We also recommend studying dentists' job contents, job complexities and job satisfaction in relation to the work structure and level of task redistribution in their practices because the Committee on Innovation in Oral

Healthcare suggested that dentists would have higher job satisfaction due to more task redistribution.

A previously identified gap in Abbott's theory was also identified in our study: the interprofessional relationships on the meso level did not appear to be affected by the interprofessional relations on the macro level. Newly graduated dental hygienists adapt to the workplace and develop their view on cooperation with dentists through their experiences in the workplace. It is possible that dental hygienists' low experiences, low self-efficacy and age explain the difference in interprofessional conflict between the dentists and hygienists on the macro level and the local playing field within organizations.

Chapter 4
Dimensionality of job characteristics under different job content and work setting conditions

4.1 Introduction

Research on job design, which increased substantially in the 1970s and 1980s due to growing industrial complexity, goals for greater productivity, efficiency and standardization of work, was often focused on indexing job characteristics to better understand and possibly improve motivational and enriching qualities.

The first coherent JCM of Turner and Lawrence (1965), followed by Hackman and Lawler's work (1971), finally led to the development of the JCM in 1980. In this model, Hackman and Oldham (1975, 1976, 1980) argue that five core job characteristics (i.e., skill variety, task identity, task significance, autonomy and job feedback) indirectly affect most central work outcomes (i.e., job performance, motivation and job satisfaction).

The most widely used instrument to measure these job characteristics is the Job Diagnostic Survey (JDS), which was developed to serve as a diagnostic instrument for the evaluation of job design interventions (Hackman & Oldham, 1975). The JDS scale is formed by 3 items per job characteristic. One item is a 'three-anchor item' with a seven-step rating format (the description anchors the middle and the end points). The two other items are seven-step scale Likert items; one is positively worded, and one is negatively worded. The instrument's frequent use seems to be predominantly based on the popularity of the underlying JCM; however, scholars have questioned the dimensionality of the JDS, the stability of the five-factor solution and the psychometric properties of the instrument itself.

The five-factor solution and its stability were questioned by Pierce and Dunham (1976). Pierce and Dunham revealed that most researchers simply assume the a

priori dimensionality of the five factors to exist in their samples and therefore do not make any empirical evaluations. Different factor solutions were proposed in various studies and samples, which demonstrated the necessity of examining the dimensionality in each sample studied. This was confirmed by the study of Dunham, Aldag and Brief (1977), which consisted of 20 samples from five different organizations with a wide variety in jobs and backgrounds. Here the five-factor solution was only supported in two of the twenty samples. Five samples suggested a five-factor solution that differed from the JCM dimensions, and thirteen samples led to fewer factors. Interestingly, the job characteristic that *disappeared* differed from sample to sample. Therefore, Dunham et al. (1977) recommended examining the dimensionality for each sample studied.

Likewise, Fried and Ferris (1986) found different dimensions for different subsamples in their analyses of secondary data from almost 7,000 employees in 900 jobs within 56 different organizations. Their interpretation was that JDS dimensionality varies as a function of personal and situational/contextual variables. On the one hand, the a priori five-factor solution was supported in Fried and Ferris' sub analyses for management and staff, for young people, and for highly educated employees. On the other hand, three- or two-factor solutions resulted from their sub analyses for non-managerial personnel, for older people, and for workers with less education. In their review, Fried and Ferris (1987) reported that while job complexity was indeed best represented by more than one dimension, as many as 10 of their 18 studies failed to support the a priori five-factor solution. Most studies that fail to support the JCM suggest a smaller number of dimensions. Skill variety, task significance and autonomy are then often combined in one way or another, whereas task identity and job feedback are mostly identified as separate dimensions. Moreover, the JCM was developed to assess jobs in hierarchical settings, and the model's internal coherence has never been studied among self-employed workers. In self-employed workers, a different structure of core job dimensions is possible due to their independent status and the responsibility for their own business.

In addition to the variation in dimensionality due to conceptual differences, methodological and statistical issues may also be responsible for the different factor solutions. A sixth factor, consisting of only negatively worded items, was found in three studies (Harvey, Billings & Nilan, 1985; Idaszak & Drasgow 1987; Kulik, Oldham & Langner, 1988). To eliminate this measurement artifact, a revised version of the JDS with only positively worded items was introduced by Idaszak and Drasgow (1987). With this revised JDS, the a priori five-factor solution was found in a sample of printing plant employees (Idaszak & Drasgow, 1987) and in white collar workers (Cordery & Sevastos, 1993). Kulik et al. (1988), however, found the recommendation to reverse the negatively worded items premature. They compared the original and the revised JDS among dairy workers and found that the revised JDS was a better fit for the five-structure model, but the reversed items did

not generally improve the JDS's usefulness in predicting satisfaction, internal motivation and productivity.

Furthermore, different response formats (seven-item or five-item scales) and questionnaire lengths were identified as two main reasons for the inconsistency in the dimension structure of the JDS (Harvey et al., 1985; Idaszak, Bottom & Drasgow, 1988). The recommendation was made to increase the number of items, especially when reversing the negatively worded items (Idaszak et al., 1988; Taber & Taylor, 1990; Burke, 1999), and to prevent invalid responses, which Burke (1999) pointed out as a more serious problem than the negatively worded items. Idaszak et al. (1988) and Boonzaier (2001) identified small sample sizes as another specific methodological problem.

Exploratory factor analysis (EFA) was used to determine different factors in many studies; however, confirmatory factor analysis (CFA) would have been a more appropriate technique (Fried & Ferris, 1986) because the EFA does not provide a test of a given model. Importantly, CFA is based on specific hypotheses concerning the given model. Moreover, CFA allows one to separate the measurement model from the structural model (Kulik et al., 1988).

In conclusion, empirical support for the hypothesized five-factor structure of the JDS is limited because of both conceptual (theoretical) and methodological issues. Nevertheless, the JDS is still the most widely used instrument to assess job characteristics because it can serve as a diagnostic device for subsequent job design interventions (Taber & Taylor, 1990). While general agreement exists that the five job characteristics in the underlying JCM are the central job complexity dimensions (Fried & Ferris, 1986), one must be careful in a priori assuming the JCM five-factor structure for a specific population in the JDS. Because the JDS was initially designed to assess differences across jobs, more research is still needed to test the theory and investigate jobs characteristics across jobs and in theoretically relevant subgroups.

The conceptual issues are where our interest lies in this study. As recommended by Dunham et al. (1977), we examined the dimensionality in our sample, and if necessary, adapted the items/scale according to the findings in our population for further study. More importantly, however, we wished to contribute to the knowledge about conditions that influence the dimensionality of perceived job complexity. As mentioned, conceptual issues concerning personal (age and education) and contextual (position level) variables could affect the factor structure. Therefore, our goal was not to test whether the five-factor solution proposed by Hackman and Oldham is universally valid. Instead, our goal was to gain further knowledge on the conditions that influence job complexity's dimensionality. In other words, we wanted to investigate whether people conceptualize job complexity differently when conditions change, and if so, how? Indeed, we wanted to determine *to what extent the structure of perceived job*

characteristics was stable under the condition of changes/differences in job content and work setting.

A qualitative change in the conceptualization of the construct of interest has often been referred to as *gamma change* (Chan, 2003). For example, in the language of factor analysis, the number of factors assessed by a given set of measures may change from one time point to another (Chan, 2003). Many studies are focused on the investigation of quantitative changes over time, assuming that there are no qualitative changes present. Before we can draw any conclusions on the quantitative changes, however, we must measure the invariance over time in terms of whether the same construct is being measured over time and with the same precision (Chan, 2003).

The profession of dental hygienists in the Netherlands went through major changes in the past few years (e.g., the educational and legal systems changed). To stimulate task redistribution and broaden dental hygienists' scope of practice, training was added for a few new tasks and was extended for some traditional tasks in a new four-year curriculum (Section 1.3.3). This enabled us to assess the dimensionality of job complexity within one profession across different job contents and work settings. Two groups of dental hygienists were compared: those educated in the two- and three-year curricula (old style) and those educated in the four-year curriculum (new style). The differences in job content between these two groups are demonstrated in Chapter 3. In short, we found that the old style group commonly performed traditional dental hygiene tasks, whereas the new style dental hygienists were more likely to have an extended job content.

In this study, we attempted to take the relevant methodological issues that have been raised into account, such as the increased number of items per subscale. Related to this methodological issue, we decided to use the 25-item Dutch version of the job characteristics scale proposed by Biessen (1992) and based on the JDS. Although the items in both scales are not identical, nearly all items from the JDS are represented by one or more items on the Biessen scale. The Biessen scale consists of five items per job characteristic, and there are only three negatively worded items in the scale (one for autonomy and two for job feedback). One item for task identity was not applicable to our population; therefore, we used the remaining four items to assess task identity. Biessen himself (1992) tested this scale by means of EFA and CFA analyses in a sample of 3,884 respondents from fourteen different organizations in three different sectors and concluded that the three-factor solution was the best way to identify different job characteristics (i.e., task significance, autonomy and job feedback).

In summary, the purpose of this study was to examine the dimensionality of job characteristics in our sample, and if necessary, adapt the items/scale according to the findings for further study. Moreover, our goal was to gain further knowledge to

which extent changes/differences in job content and work setting could lead to changes in dimensionality of job characteristics.

4.2 Data analysis methods

Data from two subsamples of old style and the new style population dental hygienists were used to answer the research question. Both EFA and CFA were performed to gain insight into the dimensionality of the 24 items on job characteristics (Table 17). Three EFAs were performed (i.e., in the old style 1 and 2 subsamples and in the new style population). The subjects-to-variables ratio was not lower than five (Bryant & Yarnold, 1995). Principal component analyses with Varimax rotation were conducted on the correlation matrices. The number of factors was obtained from the eigenvalues and scree plots. Subsequently, factor analyses were performed for the lower and the higher number of factors, as obtained from the eigenvalues and scree plots, to decide on the optimal factor solution. Cattell's salient similarity index was used to compare the factor structure between the old and the new style dental hygienists (Cattell, Balcar, Horn & Nesselroade, 1969). Two solution loading patterns were compared, and a P-value was converted to test the null hypothesis that the two factor solutions being compared were not related.

Confirmatory factor analysis was performed using the Oblique Multiple Group Method (OMG) (Stuive, 2007) to test the model correspondence with the Hackman and Oldham a priori factor pattern. Thus, the number of factors was not a point of discussion in this part of the analysis. In the first step, the subscales were constructed by taking simple sums of the items that were assigned to the same subscale. Next, we computed the correlation of each item with each subscale. Correlations between each item and the assigned subscale were corrected for self-correlation. Instead of computing the correlation between the specific item and the assigned subscale, the correlation was computed between the specific item and the sum of all of the other items that belonged to a specific subscale. An item is expected to correlate most highly with the subscale to which it is assigned. If an item correlates more highly with another subscale, then the item was wrongly assigned (Stuive, 2007).

To draw conclusions on the existing factors in our scale, we compared the outcomes of OMG analyses performed in three subsamples. We identified the wrongly assigned items and questioned if these items were a proper predictor in the specific subscale. For this comparison, a criterion needed to be identified to define how large a difference in the item's correlation level between different subscales must be before we can conclude that an item is part of a certain subscale (or wrongly assigned). Because there is no consensus on this matter in the literature (Stuive, 2007), we made the following classification:

- (+) correlation is the highest for the subscale this item is assigned to and low on other subscales (difference in correlation level > 0.040);
- (+/-) correlation is the highest for the subscale this item is assigned to but also high on another subscale(s) (difference in correlation level < 0.040);
- (-) correlation is the highest for a subscale this item is not assigned to but also high on another subscale(s) (difference in correlation level < 0.040);
- (--) correlation is the highest for a subscale this item is not assigned to and low on other subscales (difference in correlation level > 0.040).

Additionally, based on the clear differences in the job content between dental hygienists working in dental hygiene practices and dental hygienists working in other types of practices, we performed a sub analysis based on these different work settings. The sample of 631 respondents (the old style 2 + new style populations) was divided based on the information about what kind of practice the respondent worked for the most hours each week. Dental hygienists working in dental hygiene practices have no supervisor and fewer colleagues compared with dental hygienists working in other kind of practices. In most dental hygiene practices, the only dental professionals employed are dental hygienists who seldom employ a dentist or a dental assistant.

Table 17. Job characteristics items based on Biessen (1980)

Item code	Item
V1	I am able to use all of my skills in my job.
V2	I am able to use all of my possibilities in my job.
V3	My work is varied.
V4	I have a varied job.
V5	The tasks that I carry out differ from one another.
I1	In my job, I can completely finish the tasks that I start.
I2	The result of my efforts is visible in the products or services that are delivered.
I3	My work consists of making a complete product (or delivery of a separate service).
I4	I can carry out my work myself from beginning to end.
I5	My contribution is recognizable in the totality of my activities in this practice.
S1	The work that I do is significant to this practice.
S2	The work I do is significant to the functioning of my colleagues.
S3	The work I do is significant to society.
S4	The work I do is significant to the patients of this practice.
A1	I have the opportunity to decide how to carry out my work.
A2	I can perform independently in my work.

Item code	Item
A3*	The freedom to operate that my employer allows me is sufficient.
A4	There are possibilities to carry out my work the way I choose.
A5	In my function, I can carry out tasks independently.
F1	Carrying out my work gives me immediate feedback as to how I perform.
F2	I can assess if I am performing well from the process of my work.
F3#	To assess how well I am performing in my work, I am dependent on the feedback of others.
F4	I can record how well I am performing myself.
F5#	In my work, you never know if you're actually doing well.

* Negatively phrased items in the old style population and positively phrased items in the new style population.

Negatively phrased item in all subsamples.

4.3 Results

4.3.1 Dimensionality of job characteristics - EFA

In all three samples, Kaiser-Meyer-Olkin measure of sampling adequacy was >0.810, and Bartlett's test of sphericity was significant. Taken together, these tests provided a minimum standard that was necessary before an EFA could be conducted.

The eigenvalue pattern in the EFA of the old style 1 group suggested that a seven-factor solution was the most appropriate (Table 18). Four job characteristic a priori scales were confirmed: task identity, task significance, autonomy and job feedback. Skill variety was clearly divided into two different factors: 1. skill variety - chance to use all skills and knowledge and 2. task variety - the extent to which an individual performs different tasks. The last additional factor consisted of three negatively worded items (one from the autonomy subscale and two from job feedback). Furthermore, item I5 showed a greater correlation with the task significance items, and item S4 was highly correlated with autonomy items.

For the old style 2 subsample, the same seven-factor solution was most appropriate in the EFA (Table 19), and skill variety was again divided into two different factors: 1. skill variety - chance to use all skills and knowledge and 2. task variety - variety in tasks performed. Both subscales correlated positively with each other ($r=.48$, $p<0.001$) (Figure 19). For the other four job characteristics, the a priori scales were confirmed. Two negatively worded items from job feedback formed the additional seventh factor. A3, a negatively worded item from the autonomy subscale, correlated almost equally high with the autonomy subscale and negative phrased items from job feedback. Item I5 was highly correlated with both task identity and

task significance items, and item F4 was highly correlated with autonomy and job feedback.

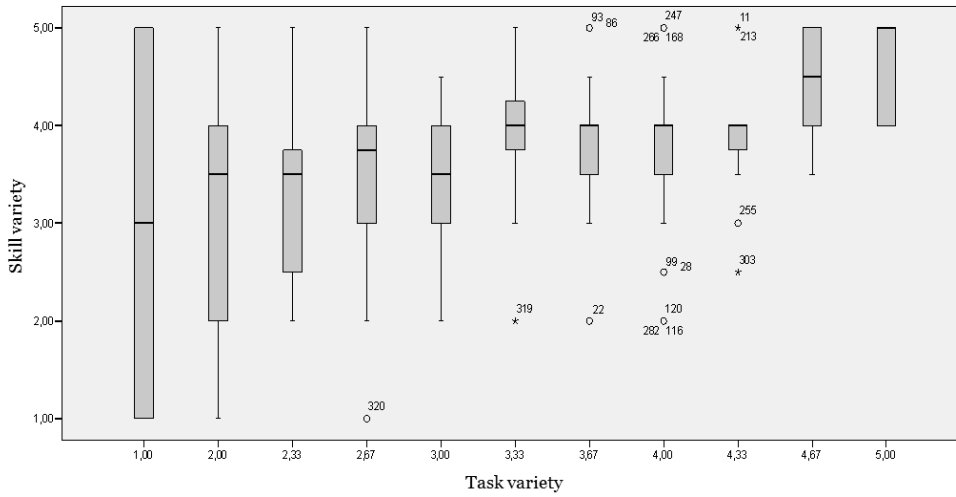


Figure 19. Box en wiskers plot: Two separate factors in JCM skill variety in the old style group positively correlated; skill variety and task variety

Table 18. EFA, seven-factor structure for the old style 1 sample (n=281)

Items	Factor						
	1	2	3	4	5	6	7
Skill variety							
V1		.301				.871	
V2						.887	
V3		.888					
V4		.913					
V5		.879					
Task identity							
I1				.646			
I2				.627	.309		
I3				.706			
I4				.663			
I5			.463	.420			.312
Task significance							
S1			.591				.354
S2			.742				
S3			.774				
S4	.696		.308				
Autonomy							
A1	.831						
A2	.718						
A3							.647
A4	.737						
A5	.801						
Job feedback							
F1					.670		
F2	.306				.812		
F3							.767
F4					.641		
F5					.478		.532

Loadings above 0.3 are shown.

Table 19. EFA, seven-factor structure for the old style 2 sample (n=403)

Items	Factor						
	1	2	3	4	5	6	7
Skill variety							
V1						.826	
V2						.846	
V3			.903				
V4			.923				
V5			.851				
Task identity							
I1		.724					
I2		.716					
I3		.749					
I4	.366	.731					
I5	.311	.465		.374			
Task							
S1	.316			.658			
S2				.594			
S3				.670			
S4	.352			.700			
Autonomy							
A1	.812						
A2	.807						
A3	.307				-.355		.314
A4	.786						
A5	.687						
Job feedback							
F1					.803		
F2					.824		
F3							.790
F4	.502				.501		
F5							.786

Loadings above 0.3 are shown.

In the new style population, a six-factor structure was obtained (Table 20), and the a priori five-structure solution of job characteristics was confirmed. The additional sixth factor consisted of two negatively worded items from job feedback. In contrast to the old style subsamples, skill variety was not split into two different factors. Here, however, inconsistency was observed in the task identity subscale. Items I1 and I2 were both highly correlated with items from task identity and job feedback, whereas I5 only correlated with the items from task significance.

Table 20. EFA, six-factor structure for the new style population (n=211)

Items	Component					
	1	2	3	4	5	6
Skill variety						
V1	.702				.444	
V2	.736				.403	
V3	.898					
V4	.888					
V5	.846					
Task identity						
I1				.532	.488	
I2				.558	.535	
I3					.712	
I4		.310			.666	
I5			.522			
Task significance						
S1			.792			
S2			.669	.323		
S3			.752			
S4			.724			
Autonomy						
A1		.702				
A2		.795				
A3		.761				
A4		.671	.308			
A5		.573		.393		
Job feedback						
F1				.675		
F2			.309	.706		
F3						.730
F4		.322		.636		
F5						.755

According to the Catell's salient similarity index (Appendix VII), the factor structures of the old style 2 subsample and the new style sample were similar. All 6 identified factors in new style sample were significantly related to the same six factors identified in the old style sample ($p=0.002$ for factor job feedback and $p<0.001$ for all other factors).

4.3.2 Dimensionality of job characteristics - CFA

In the old style 1 sample, five items showed a higher correlation with a subscale to which they were not assigned: I5, S1, S4, A3 and F1 (Table 21). Of these five items, I5 was strongly correlated with task significance, S1 with task identity and S4 with the autonomy subscale. The other two items loaded equally on two or even three different subscales: A3 on autonomy and feedback, and F1 on task identity, autonomy and job feedback.

Two subscales were perfectly identified in the old style 2 group: skill variety and task identity. S1 showed high correlation with both items from task identity and task significance, although the difference in correlation was minimal (r=0.516 with task significance and r=0.526 with task identity) (Table 22). For the autonomy scale, A3 (negatively phrased item) displayed a higher correlation for a subscale to which it was not assigned i.e., skill variety). Furthermore, F4 was highly correlated with items from the autonomy subscale.

In the new style population, two items (A3 and F4) switched between subscales (Table 23). A3 demonstrated a high correlation with skill variety, and F4 moved to the autonomy subscale. Although F1 showed the best correlation with job feedback, this item also showed a high correlation with items from task identity.

Table 21. CFA, corrected correlations between the items and the five job characteristics in the old style 1 sample (n=281)

Item	VAR	ID	SIG	AUT	FB
V1	**.604**	.217	.179	.148	.101
V2	**.622**	.204	.145	.100	.010
V3	**.799**	.218	.150	.062	.026
V4	**.773**	.223	.155	.079	.045
V5	**.713**	.148	.163	.110	.043
I1	.219	**.431**	.200	.249	.185
I2	.217	**.546**	.359	.262	.392
I3	.056	**.514**	.279	.233	.294
I4	.159	**.495**	.241	.342	.318
I5	.194	.447	**.501**	.336	.361
S1	.175	**.496**	.446	.321	.331
S2	.157	.304	**.439**	.116	.127
S3	.085	.220	**.493**	.205	.154
S4	.137	.308	.368	**.505**	.277
A1	.108	.325	.390	**.607**	.315
A2	.074	.285	.264	**.571**	.355
A3	.037	.150	.098	**.216**	**.236**
A4	.083	.374	.332	**.561**	.321
A5	.114	.412	.378	**.644**	.428
F1	.168	**.388**	**.373**	.287	**.367**
F2	.071	.365	.295	.404	**.647**
F3	-.076	.110	.018	.244	**.289**
F4	.030	.364	.235	.363	**.459**
F5	.041	.258	.098	.194	**.376**

Table 22. CFA, corrected correlations between the items and the five job characteristics in the old style 2 sample (n=403)

Item	VAR	ID	SIG	AUT	FB
V1	**.587**	.302	.258	.276	.237
V2	**.564**	.317	.226	.306	.257
V3	**.782**	.191	.178	.254	.100
V4	**.793**	.218	.202	.232	.108
V5	**.688**	.161	.233	.113	.032
I1	.237	**.636**	.326	.367	.339
I2	.262	**.661**	.369	.370	.446
I3	.205	**.568**	.290	.303	.336
I4	.175	**.652**	.307	.449	.322
I5	.293	**.561**	.464	.421	.441
S1	.220	**.526**	**.516**	.428	.366
S2	.176	.285	**.408**	.164	.116
S3	.230	.232	**.457**	.199	.135
S4	.170	.445	**.507**	.421	.334
A1	.207	.513	.405	**.642**	.401
A2	.199	.430	.408	**.668**	.363
A3	**.243**	.132	.045	.158	.118
A4	.240	.427	.323	**.594**	.394
A5	.190	.474	.349	**.501**	.442
F1	.248	**.389**	.313	.322	**.415**
F2	.219	.433	.288	.320	**.550**
F3	-.014	.154	.027	.172	**.283**
F4	.183	.398	.277	**.441**	.389
F5	.050	.246	.049	.184	**.326**

Table 23. CFA, corrected correlations between the items and the five job characteristics in the new style population (n=211)

Item	VAR	ID	SIG	AUT	FB
V1	**.612**	.314	.243	.266	.183
V2	**.618**	.326	.236	.315	.218
V3	**.795**	.216	.213	.280	.124
V4	**.791**	.232	.229	.254	.117
V5	**.700**	.179	.222	.178	.060
I1	.243	**.610**	.302	.374	.351
I2	.264	**.627**	.349	.366	.449
I3	.215	**.571**	.281	.298	.309
I4	.170	**.633**	.310	.444	.314
I5	.298	**.528**	.485	.407	.403
S1	.230	.494	**.556**	.405	.348
S2	.194	.317	**.453**	.220	.170
S3	.220	.250	**.509**	.233	.174
S4	.209	.440	**.528**	.424	.334
A1	.200	.487	.388	**.625**	.387
A2	.217	.413	.394	**.675**	.349
A3	.259	.155	.082	**.227**	.143
A4	.293	.418	.361	**.633**	.390
A5	.229	.476	.331	**.527**	.443
F1	.248	**.409**	.328	.333	**.431**
F2	.201	.438	.343	.368	**.560**
F3	-.044	.113	.018	.151	**.263**
F4	.176	**.424**	.285	**.447**	.389
F5	.081	.236	.084	.165	**.305**

To investigate whether the differences in an item's loading were due to dental hygienists' work settings, we performed a sub analysis in OMG. Tables 24 and 25 give an overview of the correlation levels in the group of dental hygienists working in dental hygiene practices and dental hygienists working in other kinds of practices, respectively. Within the sample of dental hygienists working in other practices, only item F4 was highly correlated with a subscale to which this item was not assigned. Among dental hygienists from dental hygiene practices, more inconsistency was observed. In this group, five items (S1, S4, A3, A5 and F4) were highly correlated with a subscale to which they were not assigned. This group of dental hygienists perceived the significance of their work for the practice (S1) as a part of task identity, and they perceived the significance of their work for the patients of their practice (S4) as a part of autonomy. The item A3 "The freedom to

operate that my employer allows me is sufficient" is seen as a part of skill variety, and the perceived possibility to carry out tasks independently (A5) correlates with task identity. "The possibility to record how well I am performing myself" (F4) was highly correlated with task identity in dental hygienists from dental hygiene practices.

Table 24. CFA, corrected correlations between the items and the five job characteristics of DHs in dental hygiene practices (n=200)

Item	VAR	ID	SIG	AUT	FB
V1	**.572**	.294	.223	.193	.194
V2	**.577**	.305	.202	.255	.241
V3	**.734**	.205	.257	.284	.185
V4	**.758**	.214	.288	.232	.194
V5	**.676**	.257	.297	.188	.202
I1	.252	**.628**	.227	.372	.394
I2	.254	**.587**	.297	.363	.536
I3	.163	**.516**	.236	.204	.311
I4	.222	**.634**	.264	.435	.272
I5	.297	**.448**	.375	.387	.399
S1	.251	**.442**	**.437**	.351	.358
S2	.175	.238	**.352**	.055	.055
S3	.291	.139	**.362**	.155	.145
S4	.295	.407	**.465**	**.468**	.338
A1	.305	.459	.338	**.627**	.396
A2	.234	.428	.296	**.591**	.352
A3	**.155**	.072	-.013	.069	.095
A4	.336	.510	.310	**.594**	.370
A5	.241	**.505**	.374	.424	.403
F1	**.345**	**.346**	.271	.270	**.356**
F2	.338	.481	.292	.351	**.544**
F3	.035	.203	.003	.191	**.352**
F4	.281	**.447**	.254	.340	**.433**
F5	.051	.218	.008	.141	**.318**

Table 25. CFA, corrected correlations between the items and the five job characteristics of DHs working in other practices (n=414)

Item	VAR	ID	SIG	AUT	FB
V1	**.628**	.332	.252	.312	.197
V2	**.636**	.347	.253	.372	.235
V3	**.822**	.226	.198	.294	.112
V4	**.804**	.249	.209	.285	.103
V5	**.710**	.166	.199	.212	.030
I1	.242	**.603**	.332	.379	.337
I2	.278	**.639**	.367	.362	.404
I3	.241	**.597**	.299	.338	.313
I4	.156	**.630**	.326	.437	.321
I5	.314	**.556**	**.529**	.400	.381
S1	.230	.508	**.606**	.415	.329
S2	.203	.368	**.517**	.314	.260
S3	.194	.294	**.573**	.259	.181
S4	.188	.445	**.555**	.402	.319
A1	.196	.491	.409	**.614**	.347
A2	.231	.393	.428	**.689**	.308
A3	.313	.222	.142	**.397**	.239
A4	.324	.386	.385	**.641**	.354
A5	.263	.456	.317	**.546**	.409
F1	.233	**.424**	.351	.327	**.435**
F2	.177	.408	.366	.340	**.537**
F3	-.075	.056	.021	.119	**.194**
F4	.159	.402	.297	**.464**	.324
F5	.096	.244	.117	.181	**.310**

We found different inconsistencies in correlation levels between different populations and subgroups; Table 26 provides an overview of the correlation fits in the CFA of all items and groups. There were seven items with inconsistencies in their correlation level with the subscale to which they were assigned. In Table 27, these items are presented with all of the subscales with which they are highly correlated.[1]

[1] We also performed a CFA analysis in LISREL 8.8 on the 24 job characteristics items and found that only negatively worded items loaded low on the scale they were assigned to; three items in the old style population – A3, F3 and F5 and two items, F3 and F5 in the new style population (item A3 was rephrased in the new style population). The results of this analysis are presented in Appendix XII.

According to the results from our three subsamples, we considered excluding the following items: A3 and F4. Both items were often highly correlated with subscales other than the scale to which they were assigned. Item A3 was negatively worded in old style population and rephrased in new style population, which did not solve the problem. The inconsistency of the other three items (I5, S1 and S4) was mostly due to the differences between the samples based on the work setting. In addition, item F1 was ambiguous in all subsamples, and there was a high degree of correlation with items from task identity. In all subsamples, however, item F1 showed also a relatively high correlation on the subscale to which this item was assigned. Finally, only dental hygienists from dental hygiene practices perceived A5 as a part of task identity. In all other subsamples, item A5 was correctly assigned.

Table 26. CFA, the correlation fit of each item to its theoretical subscale per subsample; bold items had inconsistent correlation fits.

Item	Old style 1	Old style 2	New style	Sub analysis	
	n=281	n=403	n=211	DHs in dental hygiene practices n=200	DHs in other work settings n=414
% in DH pract	36.7	42.8	13.3		
V1	+	+	+	+	+
V2	+	+	+	+	+
V3	+	+	+	+	+
V4	+	+	+	+	+
V5	+	+	+	+	+
I1	+	+	+	+	+
I2	+	+	+	+	+
I3	+	+	+	+	+
I4	+	+	+	+	+
I5	- -	+	+	+	+/-
S1	- -	-	+	-	+
S2	+	+	+	+	+
S3	+	+	+	+	+
S4	- -	+	+	-	+
A1	+	+	+	+	+
A2	+	+	+	+	+
A3*	-	- -	-	--	+
A4	+	+	+	+	+
A5	+	+	+	--	+
F1	-	+/-	+/-	+/-	+/-
F2	+	+	+	+	+
F3#	+	+	+	+	+

Item	Old style 1	Old style 2	New style	Sub analysis	
	n=281	n=403	n=211	DHs in dental hygiene practices n=200	DHs in other work settings n=414
% in DH pract	36.7	42.8	13.3		
F4	+	- -	-	-	--
F5#	+	+	+	+	+

* Negatively worded item in the old style subsamples.

Negatively worded item in all subsamples.

(+) Correlation is the highest for the subscale this item is theoretically assigned to and low on other subscales (difference in correlation level > 0.040).

(+/-) Correlation is the highest for the subscale this item is theoretically assigned to but also high on another subscale(s) (difference in correlation level < 0.040).

(-) Correlation is the highest for a subscale this item is not assigned to but also high on another subscale(s) (difference in correlation level < 0.040).

(--) Correlation is the highest for a subscale this item is not theoretically assigned to and low on other subscales (difference in correlation level > 0.040)

Table 27. Inconsistent items in all subsamples based on CFA analysis

Subsample	Old style 1	Old style 2	New style	Subanalysis		Conclusion
				DH practices	other settings	
Item	Highest correlation with sub-scale(s)					
I5 - My contribution is recognizable in the totality of my activities in this practice.	SIG	ID	ID	ID	ID, SIG	Some DHs perceive this item as part of task significance.
S1 - The work that I do is significant to this practice.	ID	ID, SIG	SIG	ID, SIG	SIG	This item is divided between the task identity and task significance subscales.
S4 - The work I do is significant to the patients of this practice.	AUT	SIG	SIG	AUT, SIG	SIG	DHs in DH practices perceive this item as part of autonomy, but it also shows a high correlation on item's original subscale
A3 - The freedom to operate that my employer allows me is (in)sufficient.	FB, AUT	VAR	VAR, AUT	VAR	AUT	Highly complex item with negative wording in one aspect. The item is not applicable for DHs in DH practices, and the perceived 'freedom to operate' is seen as part of variety in their job content.
A5 - In my function, I can carry out tasks independently.	AUT	AUT	AUT	ID	AUT	Only DHs in DH practices perceive the possibility to 'carry out tasks independently' as part of task identity.
F1 - Carrying out my work gives me immediate feedback as to how I perform.	ID, FB, SIG	FB, ID	FB, ID	FB, ID, VAR	FB,ID	This item is divided between job feedback and task identity.
F4 - I can record how well I am performing myself.	FB	AUT	AUT, ID	ID, FB	AUT	DHs from DH practices perceive this item as task identity and job feedback, whereas DHs from other practices perceive this item as part of autonomy.

Based on these findings, we removed items A3 and F4 from the scales, which resulted in improving the Cronbach's alpha in the autonomy subscale (Table 28); however, the reliability scale of the job feedback subscale was not improved.

Table 28. Reliability analysis of the original and modified job characteristic scales, after excluding items A3 and F4

Job characteristic scale	Cronbach's alpha original scale			Cronbach's alpha modified scale		
	Old st.1	Old st.2	New st.	Old st.1	Old st.2	New st.
Skill variety	.873	.862	.899			
Task identity	.724	.819	.772			
Task significance	.630	.651	.754			
Autonomy	.713	.674	.828	.838	.858	.791
Job feedback	.660	.619	.605	.595	.562	.550

4.4 Discussion

Minor differences in the factor structure were found among the different groups of dental hygienists according to their job content. The a priori five-structure model of job characteristics was confirmed using CFA in our study. In contrast to other studies on JDS dimensionality that had a five-factor solution or proposed even fewer factors, using EFA we found a seven-factor solution for the old style sub-samples and a six-factor solution for the new style sample.

The one additional factor was due to negatively worded items, which has also been reported in earlier studies (Dunham et al., 1977, Idaszak & Drasgow, 1987; Harvey et al., 1985; Fried & Ferris, 1986). The other additional factor for the old style dental hygienists was the result of the skill variety items being split into two different scales: three items represented *task variety – the extent to which an individual performs different tasks*, and two items stated *the skill variety - opportunity to use all of one's skills* within a job. From the conceptual perception a division in skill- and task variety was already proposed by Humphrey and colleagues (Humphrey, Nahrgang & Morgeson, 2007). They stated that task variety is conceptually more similar to other four job characteristics because they are concerned with how the work is performed and the specific tasks composing a job whereas, skill variety reflects the knowledge and skills necessary to perform a job. Because the job characteristic skill variety was only divided in two different scales in old style population and this scale was perfectly stable using CFA we decided to use this scale in his original form. One possible explanation for the division of this scale into two separate scales could be that dental hygienists are generally educated in a broad range of knowledge and skills, but hygienists in a dental hygiene practice or some other work setting cannot use all of their knowledge and skills.

Interestingly, almost half of the old style dental hygienists work in the dental hygiene practices. Only 13% of the new style dental hygienists work in dental hygiene practices; new style population experience skill variety as a single job characteristic. In the CFA, skill variety was the most stable subscale. Indeed, all five items from this subscale retained the highest correlation with other items from this subscale in all three subsamples.

The EFA showed that dental hygienists sometimes characterized their contribution within one practice (I5) as task significance instead of task identity. We speculate that the reason might be that Dutch dental hygienists are still struggling against weak recognition as dental professionals. This has previously been described in the literature on this occupation's professionalization project (Adams, 2004b) (Section 1.2.2). Therefore, dental hygienists see their contribution within one practice as significant for the practice instead of a part of task identity because of the belief that an oral healthcare team should always include a dental hygienist.

New style dental hygienists viewed finishing the tasks they started (I1) and the visibility of the results of their efforts in the products or services that are delivered (I2) as part of job feedback instead of task identity. One possible post-hoc explanation would be the expanded need for cooperation with dentists and dentist supervision among the new style population. This group of dental hygienists is educated to perform more tasks and to take an active role in diagnosis and treatment of different patients/diseases, but they cannot act independently in the entire treatment process, which makes it extremely difficult for them to identify the whole product or service they deliver. In some cases, dental hygienists only take part in a long-term treatment, and they need feedback from dentists to finish the tasks they started; thus, the results of their effort (in terms of products/services delivered) are being supervised. Therefore, they may perceive these aspects as job feedback instead of task identity.

The old style 1 subsample experienced the significance of their job to help patients as job autonomy instead of job significance. This group consisted of a high number of dental hygienists in dental hygiene practices with the traditional scope of practice, which primarily consists of prevention and periodontology services. Larger differences in factor loadings were found between dental hygienists from other work settings and dental hygienists from dental hygiene practices. The latter often work solo or with other dental hygienists as colleagues and have less need for cooperation with dentists and dentist supervision due to a clear division in the traditional tasks between dentists and dental hygienists. It may be possible that they experience the significance of their job to help patients as job autonomy because they have their *own* patients for which they are responsible.

In the CFA, most inconsistency was found for the item, *The freedom to operate that my employer allows me is sufficient (A3)*. Dental hygienists identified this item as a component of task variety. Moreover, this item was not applicable for self-

employed dental hygienists because they have no supervisor, and most dental hygienists working in dental hygiene practices are self-employed. Because of the large percentage of self-employed dental hygienists from dental hygiene practices among the Dutch dental hygiene population and inconsistent findings in our samples, we chose to exclude this item from the scale. Another reason for the exclusion of this item was that the item was negatively worded in the old style subsample 1 and positively worded in the old style subsample 2 and new style population, which did not solve the problem. This item displayed the most inconsistencies in both the positively and negatively worded forms. Therefore, in all studies among dental hygienists, we recommend the use of the remaining four items to measure experienced autonomy (A1, A2, A4 and A5).

The high number of self-employed dental hygienists working in dental hygiene practices could also be the reason that the item on the possibility to *record how well I am performing myself* was highly correlated with the autonomy scale instead of the theoretical job feedback scale. Nevertheless, this item is difficult to identify for dental hygienists because they are involved in long-term patient treatments in which patient behaviors play a significant role (i.e., the success of the dental hygienists' treatment depends on patient compliance). Therefore, we chose to exclude this item, and we recommend the use of the remaining four items (F1, F2, F3 and F5) to measure experienced feedback from the job in a dental hygiene population. In addition, this item may need to be excluded also for other medical professions involved in long-term patient treatments depending on patient compliance.

The least stable job characteristic factor turned out to be feedback from job. There are several possible explanations. First, it may be that most of the items on job feedback are difficult to interpret for occupations in healthcare because of their involvement in the long-term delivery process of healing and curing (i.e., the results/outcomes are not easy to define). Second, for perceived job feedback, information is needed from patients, colleagues, and supervisors. Again, the dental hygienists from dental hygiene practices and other practices differ in their perception due to fewer colleagues and no (dentist) supervisor. Third, the meaning of feedback from job may change over time, in other words a case of gamma change. For example, newly graduated new style dental hygienists are used to receiving feedback during their studies, and they are aware that they need feedback because of their lack of experience. Old style dental hygienists, however, have more experience and could perceive feedback as a type of criticism. Fourth, job feedback contains two aspects: the actual job feedback and the feedback from the supervisor about the job. One interesting outcome in job feedback was that two negatively worded items were highly correlated on the subscale to which they were assigned, whereas we observed significant inconsistency for positively worded items. All of this suggests that the dimensionality of the job feedback subscale should be studied

in healthcare occupations, possibly after rephrasing the two negatively worded items.

For the new style population, the obtained factor structure more closely resembled the a priori structure than for the old style population. This population consisted of fewer dental hygienists in dental hygiene practices, and this group was significantly younger than the old style population. These findings agreed with the results of Fried and Ferris (1986) and supported the a priori five-factor solution in the sub analyses for management and staff, for young people, and for highly educated employees. The new style population consisted of more highly educated younger employees than the old style population, which may explain why the obtained factor structure resembled the a priori structure.

In this study, we conducted both EFA and CFA. One important limitation in previous research in this area is that EFA has often been used to examine the dimensionality of the JDS, whereas the more appropriate technique would be CFA (Harvey et al., 1985; Fried & Ferris, 1986). Exploratory factor analysis does not provide a test for a given model, whereas CFA is based on specific hypotheses of the factor structure. We examined the similarity of the obtained factor structures and the a priori factor structure of the Dutch version of the JDS.

For CFA, we choose the OMG method instead of the confirmatory common factor (CCF) method. The OMG method was neglected for several decades, especially with the introduction of new CCF techniques such as LISREL (Jöreskog & Sörborn, 1981); however, studies have shown that the OMG is conceptually much simpler than the CCF and never fails to find a solution, whereas the CCF method does not always find a solution (Stuive, 2007). One of the problems that can occur with the OMG method though is spuriously high correlations. In general, there are two possible reasons for spuriously high correlations in OMG: self-correlation and the subscale length. In our study, correlations between the items and the assigned subscale were corrected for self-correlation. The problem of subscale length is based on the fact that a higher number of items in the scale increases its reliability. This higher reliability is reflected by higher correlations between the subscales and the items. Correlations between an item and a subscale could therefore be higher because of differences in subscale length rather than a stronger item-subscale relationship. Therefore, it is necessary to correct for the length of a subscale to make item/subscale correlations comparable. In our study, the subscales did not differ significantly in their length. Four subscales consisted of five items, and one subscale included four items. Thus, we did not correct for subscale length.

In our study, some items had essentially the same correlation level with several subscales. The rule in OMG is to use the highest correlation level, but no criteria are given for the size of the difference in correlation levels between the subscales. Therefore, it is sometimes hard to assess certain items if they correlate similarly on more than one subscale. For this study, we made a classification based on a certain

difference in correlation level, to assess the quality of items and to generate well founded advice for additional studies with these items. Although this classification is not grounded on existing knowledge, it offers a solid basis for the recommendations for changes in scale and also offers a basis for a more thorough study on this matter.

One limitation of this study is that we could not investigate the effect of education and work setting of dental hygienists separately. These two variables are highly related; old style dental hygienists work more often in dental hygiene practices whereas new style dental hygienists work more often in dentist practices. In our attempt to separately test the effect of these two independent variables we faced the problem of too few observations in one of the four cells, which is due to low number of new style dental hygienists in dental hygiene practices.

Although we did gather longitudinal data in the new style subpopulation, at T1 this group was not large enough to test dimensionality of JCM job characteristics, which made it difficult to reveal gamma changes in this study.

4.5 Conclusion

Initially, the JCM was developed from the perspective of work within hierarchical settings, and we found some support that dimensionality is different for the self-employees and for professionals who engage in long-term service delivery in which their client participates. Here two types of variety were identified: 1) differences in the perception of task significance in a nonhierarchical setting, and 2) job feedback that is difficult to define in long-term service delivery processes. Although CFA may demonstrate that the five-factor structure is applicable, a more thorough analysis may still reveal differences that add to our understanding of what contributes to job complexity in the population under study. Our study shows that such differences cannot be attributed to methodological issues. The added value of studying dimensionality is not only to check whether we can apply the theoretical factor structure but also to learn about what situational peculiarities contribute to particular job complexity dimensions.

Chapter 5
Changes in job content, perceived job characteristics and job satisfaction

5.1 Introduction

According to the Job Characteristics Model, the extent to which certain job characteristics are present in one's job does not determine personal or work outcomes; rather, one's perception of these job characteristics determines these outcomes. *Regardless of the amount of feedback (or skill variety, task identity, task significance, or autonomy) that a worker actually has in his work, the extent to which he perceives that he has this feedback will affect his reactions to his job* (Hackman & Lawler, 1971, pp.264-265). Regardless of the truth in this statement, the following question remains unanswered: "What is the connection between actual job content and perceived job characteristics?" There are two methods of investigating the relationship between a worker's actual job content and the perceived job characteristics.

The first method involves a comparison of worker's perception of his job characteristics with the assessment of job characteristics of this worker by the worker's colleagues and executives (Biessen, 1992). The literature provides a reasonable amount of evidence of a good or moderate agreement between a task performer's perceived job characteristics and the perceptions of the job by the performer's colleagues, executives or other assessors (Hackman & Lawler, 1971; Algera, 1983; Fried & Ferris, 1987; Taber & Taylor, 1990; Biessen, 1992; Boonzaier et al., 2001). Because these different actors, workers and other assessors tend to perceive the worker's job similarly, we conclude that a certain amount of perceived job characteristics deviate from the actual job content.

The second way to answer the question regarding the agreement between actual job content and perceived job characteristics is to investigate whether job changes lead to changes in perceived job characteristics (Biessen, 1992). This question is also viewed as a key test for the validity of the Job Diagnostic Survey (JDS) and demonstrates that changes in actual job content produce corresponding changes in

JDS scores with respect to core job characteristics (Taber & Taylor, 1990). Such manipulations in jobs have been performed in laboratory experiments, field experiments and quasi-experiments. We will discuss the outcomes of these experiments below.

In laboratory experiments (Farr, 1976; Umstot, Bell & Mitchell, 1976; O'Reilly & Caldwell, 1979; White & Mitchell, 1979; Weiss & Shaw, 1979; Terborg & Davis, 1982; Jackson & Zedeck, 1982; Farr & Scott, 1983; Griffin, Bateman, Wayne & Head, 1987; Perrewe & Mizerski, 1987; Kilduff & Regan, 1988) and field studies (Champoux, 1978; Orphen, 1979; Greene, 1981; Wall & Clegg, 1981; Griffin, 1985; Head, Molleston, Sorensen & Gargano, 1986; Luthans, Kemmerer, Paul & Taylor, 1987; Ondrack & Evans, 1987), inconsistent results are reported with regard to the agreement between actual job characteristics and either overall job complexity scores or single perceived job characteristics. Most experimental studies have found significant changes in overall job complexity or in one or more job characteristics that correspond to a change in job content. However, many field studies present mixed findings; that is, significant and non-significant relationships were found between actual job content and perceived job characteristics. These inconsistencies have been explained by the following conceptual and methodological issues.

5.1.1 Empirical issues

The first issue that is responsible for the above-mentioned inconsistencies in the relationship between changes in actual jobs and changes in perceived job characteristics is that the job manipulations in experimental settings were small; in fact, these changes were so minor that the experimental manipulation would have been insufficient to lead to any job re-evaluation in real organizations (Taber & Taylor, 1990). For example, the autonomy enrichment condition in a study consisted of allowing workers to decide when to take a break during a two-hour session (White & Mitchell, 1979). In five experimental studies, a single task (in four study manuals) is manipulated in an attempt to enrich a job, and the measurements are based on the changes in the perceived job characteristics of this single task (Weiss & Shaw, 1979; Jackson & Zedeck, 1982; Gardner, 1986; Griffin, Bateman, Wayne & Head, 1987; Perrewe & Mizerski, 1987). Because the overall jobs were not changed in these studies, the measured effect of only a single task change on perceived job characteristics may be only a short-term effect.

Another conceptual issue concerns the study populations, as the studies were conducted in populations of clerks (Umstot, Bell & Mitchell, 1976; Champoux, 1978; Orphen, 1979; O'Reilly & Caldwell, 1979; White & Mitchell, 1979; Griffin et al., 1987), salespeople (Luthans et al., 1987), plant workers (Head et al., 1986; Ondrack & Evans, 1987) and desk receptionists (Griffin, 1985) but were not conducted in populations of semi-professional job owners. It is unclear whether

and how the relationship between actual job content and perceived job characteristics would differ among various study populations.

The third related issue concerns the selection bias of study samples. Two studies were conducted in departments that were struggling with dissatisfaction and substandard work (Griffin, 1981; Wall & Clegg, 1981). These findings may not be comparable to findings in work environments with more satisfied workers.

Finally, the previous studies were often confined to experiments or interventions within a single organization; thus, there is scarce information regarding the role of organizational, regional, and cultural influences on the relationship between actual job content and organizational climate.

In conclusion, certain conceptual issues may explain the inconsistent findings in the results pertaining to the relationship between changes in job content and subsequent perceived job characteristics and job satisfaction. These issues include minor manipulations in job content, a low level of education among employees, a dissatisfied study population, and study settings that consist of only a single organization or department. Little is known regarding the effect of differences in job content in a field for relatively satisfied populations of workers who have completed higher education.

5.1.2 Methodological issues

The first important methodological issue that may explain the inconsistent relationships is the use of social cues in the majority of the experiments that have been reported (O'Reilly & Caldwell, 1979; White & Mitchell, 1979; Weiss & Shaw, 1979; Griffin et al., 1987; Kilduff & Regan, 1988). Social cues in experiments provide both information regarding the nature of a task and implicit information regarding what constitutes an appropriate response in a given experimental situation. This social information manipulation is a type of demand characteristic (Taber & Taylor, 1990). Moreover, the social cues tended to override the effects of the actual task differences in two studies (O'Reilly & Caldwell, 1979; Kilduff & Regan, 1988). Another methodological issue is the measurement of perceived job characteristics on a team or group level rather than changes in perceived job characteristics at the individual job level (Wall & Clegg, 1981). A group comparison that was conducted in one study finds no statistical evidence of a relationship between the redesigned job sites and traditional job sites (Ondrack & Evans, 1987). These researchers could not document the actual job differences that existed (if any) among the various sites. Finally, incomplete tests are often performed in many experimental or quasi-experimental designs that include data collection before and after a job change has occurred. In many studies, comparisons between subjects were conducted rather than comparisons within subjects. Terborg and Davis (1982) recommend the use of a more appropriate analysis regarding individual changes as the dependent measure.

In conclusion, the main methodological problems that affect measurements of the relationship between changes in job content and perceptions of job characteristics and job satisfaction are the use of social cues, group-level measurements and incomplete tests, including between-subject measurements rather than within-subject measurements. Most importantly, the majority of studies manipulated jobs in experimental settings; thus, few field studies are available. In view of the JCM's applicability in practice, it is important to obtain further insight into the types of changes in job content that occur in actual work environments without artificial interventions.

5.1.3 Research question and hypotheses

Given the conceptual and methodological issues that were reported in previous studies, we aim to investigate the relationship between perceived job characteristics and job satisfaction that result from changes in job content in a setting of satisfied professionals in a range of practices. We choose satisfied professionals (Section 1.2.2) because it is generally easier to detect changes in jobs that have significant potential for improvement, such as the jobs of unsatisfied professionals, compared with the group of professionals who are already satisfied with their jobs. The main advantage of our study is that the changes in job characteristics are expected to occur as a result of changes in the dental hygiene scope of practice, and these changes are not manipulated within an artificial environment. Furthermore, the inclusion of a high number of organizations facilitates an investigation of the relationship between changes in job content and perceptions of job complexity and job satisfaction while controlling for the influence of organizational and regional factors; thus, this approach may increase the generalizability of our study to small organizations in professional service delivery settings. In contrast with the types of occupations and dissatisfied workers that were selected in the previous studies, our population consists of satisfied educated professionals with relatively complex job content. As recommended, for part of the sample, individual change scores will be used to test the model.

The aim of this study is to investigate whether the same type of professionals with different job content perceive job characteristics and job satisfaction differently. We included two groups of dental hygienists whose job content we expected would differ. The first group of dental hygienists was educated in the old curriculum and was trained in traditional tasks; that is, this group consists of old style dental hygienists. The second group of dental hygienists was educated in the new curriculum, which prepares students for a more extended scope of practice; that is, this group consists of new style dental hygienists (Section 1.2.2). The main research question is the following:

What is the relationship between job content, perceived job complexity and job satisfaction in professionals with different or changing scopes of practice and what is the effect of role conflict, role ambiguity and GNS on this relationship?

First, based on the main principles of Hackman and Oldham's JCM, we expect those dental hygienists with expanded scope of practice to perceive higher levels of job complexity with respect to skill variety, task identity, task significance, autonomy and job feedback. Consistent with the JCM, higher levels of job satisfaction are also expected among this group of dental hygienists, which brings us to our first hypothesis:

Hypothesis 1: *Expanded job content is positively related to job complexity and job satisfaction.*

Based on changes in the education of dental hygienists, an education that offers knowledge and skills in extended tasks to the new style group, we expect new style dental hygienists to have increased and extended job content. Therefore, based on the main principles of Hackman and Oldham's JCM, we also expect new style hygienists to perceive higher levels of job complexity and job satisfaction. From the governmental perspective, task redistribution is expected to increase job satisfaction because there should be more opportunities for professional development (RVZ, 2002; Commissie Innovatie Mondzorg, 2006). Due to the changes in their education their scope of practice can overlap with the dentistry domain, and therefore, new style dental hygienists may also perceive a slightly greater amount of role conflict and role ambiguity. Our expectations regarding differences between old and new style population are tested in the next hypothesis:

Hypothesis 2: *Compared with old style dental hygienists, new style dental hygienists have more expanded job content, which increases job complexity and job satisfaction, but is also related to a higher level of role conflict and role ambiguity.*

As a result of the increasing experience of new style dental hygienists during the two-year period in our longitudinal study, we expect these dental hygienists to expand their job content and experience a corresponding increase in job complexity. However, no significant increase in job satisfaction is expected according to the results of previous studies on changes in job satisfaction related to changes in job content (Griffin, 1991; Kacel et al., 2005). A study among nurse practitioners, who similarly serve as substitutes for the tasks of physicians, demonstrated a high level of job satisfaction in the first year of experience, but their levels of job satisfaction decreased steadily with each additional year of experience (Kacel et al., 2005). Another longitudinal study showed a long-term increase in perceived job characteristics as a result of changes in job content, whereas job satisfaction increased rapidly after job content changes but then diminished and resumed its initial level (Griffin, 1991). Our longitudinal data allow us to test the following hypothesis regarding changes in job content and perceptions of job characteristics and job satisfaction within subjects:

Hypothesis 3: *Over a two-year period, the job content of newly graduated dental hygienists expands, and their perceived job complexity increases, but their job satisfaction remains static.*

In addition, different job content may be found within different types of practices. For example, current legislation does not allow dental hygienists in dental hygiene practices to use the x-ray device or to administer local anesthesia. Furthermore, dental hygienists in dental hygiene practices do not commonly treat caries because of regulations concerning the assignment and possible supervision of these tasks by dentists. Therefore, we expect that this group of dental hygienists will differ in their job content and their perceptions of job complexity from those of dental hygienists in other types of practices. To investigate the relationship between the job content and perceived job complexity in different work settings, we perform a sub-analysis of dental hygienists working in dental hygiene practices and dental hygienists from all other types of practices (with the exception of dental hygiene practices). A dental hygiene practice is in a mono-disciplinary practice in theoretical terms[2]. Our data on dental hygienists in different settings allow us to test the following hypothesis:

Hypothesis 4: *Dental hygienists from dental hygiene practices have less extended job content, which is related to lower role conflict, role ambiguity, job complexity and job satisfaction compared with dental hygienists in other settings.*

As many auteurs stress the relationship between perceived job characteristics and dependent variables in the JCM (Section 1.3.2), instead, we concentrated on the relationship between job content and perceived job characteristics and the mediating role of job complexity in the relation between job content and job satisfaction.

Our qualitative data showed a significant effect of interprofessional relations between dentists and dental hygienists on dental hygienists' perceived job characteristics and job satisfaction. Therefore, we also tested the effect of two work environment variables: role conflict and role ambiguity in the relations between job content, job complexity and job satisfaction.

The literature is inconclusive about the effect of role conflict on the job complexity and job satisfaction; sometimes, role conflict is considered as a dependent variable next to job satisfaction (Humphrey et al., 2007) whereas in other studies role conflict is considered as an explanatory factor for job satisfaction (Jackson & Schuler, 1985). There is even one study which describes the moderating effect of role conflict on the relation between job complexity and job satisfaction (Tosi, 1971). Kim, Knight and Crutsinger (2009), on their turn, report that role conflict and role ambiguity influence job characteristics; the latter acting as a mediator of the influence of the former on job satisfaction. Given these inconsistencies in the literature, we decided to test the effect of role conflict in more than one way to better explore its effect.

Our data allow us to compare the three different hypotheses following from this literature concerning the main relations in the JCM and the relations of role conflict with the main variables in this model.

Hypothesis 5*: The relation between job content and job satisfaction is mediated by job complexity and by role conflict.*

Hypothesis 6: *The relation between role conflict and job satisfaction is mediated by job characteristics.*

Hypothesis 7: *Role conflict moderates the relation between job content and job complexity.*

[2] However, both terms are used in this study; the term "dental hygiene practice" is used for clarity of practical implications, whereas the term "mono-disciplinary practice" is used in testing the theoretical variables in a test model.

These last three hypotheses are tested based on the two test models that are presented in Section 5.3.5 and 5.3.6. In the following section, we describe our approach to define, measure and analyze job content, perceived job complexity and job satisfaction scales.

5.2 Data analysis

The definitions of the job content scales and the explanation of the measurements were presented in Section 2.1.2 and 3.2.1.1, respectively.

5.2.1 Defining job complexity and job satisfaction

According to the findings in our study on the internal coherence of the JCM, we removed two (Chapter 4) of the 24 job characteristic items from our scales. The scores of the remaining 22 items are allocated to five job characteristics. Because the five job characteristics consisted of a different number of items, the sum of the item scores is divided by the number of items to establish a single job characteristic scale score. The means and standard deviations of these five job characteristics were calculated for all subsamples. *Job complexity* (MPS score) was computed as an unweighted additive index of the remained 22 job characteristic items.

Two work environment variables (i.e., role conflict and role ambiguity) were derived from four and seven items, respectively, in our questionnaire. Three job satisfaction scales were used: for intrinsic job satisfaction, extrinsic job satisfaction and satisfaction with career (Section 2.1.2).

5.2.2 Statistical analyses

5.2.2.1 Comparing subgroups with different degrees of expanded job content

To test the hypothesis 1, we grouped the respondents in clusters with homogenous job content. A cluster analysis was conducted in two steps. In the first step, the hierarchical cluster technique (Ward linkage) indicated that the respondents would be optimally grouped into five clusters. This number was the input for the non-hierarchical cluster technique (K-means) in the second step of the cluster analysis. This cluster analysis was based on 12 task groups (Section 3.2.1.1) and was performed on the data for the old and new style groups. To obtain a stable solution, we also performed a cluster analysis with all individual task items. Both cluster solutions were found to be comparable. Moreover, a discriminant analysis and one-way analyses of variance (ANOVA) were conducted to test our cluster solution.

The K-means cluster analysis is known for its sensitivity to outliers. Five respondents were excluded from the cluster analysis because of their special work settings: hospital (n=2), public health sector (n=1), dental hygiene school (n=1) and scientific research (n=1). Outlying scores were found for more than one task group in these respondents.

5.2.2.2 Comparisons between the old and new style groups

To test the hypothesis 2, T-tests were used to compare the means of all task groups, role conflict, role ambiguity, job characteristics and job satisfaction scores between the old and new style dental hygienists. In this chapter, we used data from the old style 2 subsample and the total group of new style dental hygienists (new style 2 subsample + 17 unpaired measurements from the new style 1 subsample) (Section 2.1).

As we performed many tests on a single data set, we were aware of an increased possibility of type I errors (Abdi, 2007). Therefore, to decrease the probability of false positive outcomes, we established the alpha value as 0.005 rather than 0.05. This alpha value was used throughout all t-tests, ANOVAs and paired t-tests.

5.2.2.3 Comparison within the group of new style dental hygienists

To test the hypothesis 3, in the new style group, we investigated the relationship between changed job content and perceived job characteristics at the individual level. We could identify 50 paired measurements in this group. Spearman correlation analyses were performed to initially describe the associations between changes in task groups, job characteristics, overall job complexity and job satisfaction scales between T1 and T2. Paired sample t-tests were performed on the task groups, job characteristics, role conflict and role ambiguity, and job satisfaction scales to examine differences between the first (T1=2007) and second (T2=2009) measurements.

5.2.2.4 Comparisons across different work settings

To investigate differences between the work settings (hypothesis 4), we compared job content and perceived job characteristics between the group of dental hygienists working in dental hygiene practices and the group of dental hygienists working in other types of practices. All 614 respondents from the old and new style groups were included in these analyses. The respondents with two or more jobs were requested to fill out the questionnaires for their job with the highest weekly working hours in the particular work setting. According to these data respondents were categorized in different work setting groups. Independent t-tests were used to compare job content, perceived job characteristics, role conflict, role ambiguity and job satisfaction between both groups.

5.2.2.5 Relationships between job content, job complexity and job satisfaction

Structural equation modeling by LISREL (8.8) was performed to integratively test the relationships among job content, job complexity and job satisfaction combined with the influences of the work environment variables of interest. We first used multiple linear regression analyses to identify the expected main effects from existing theories that should apply to the entire sample, and we then explored the possible influences of the work environment variables that were added to the model. Based on these outcomes, we specified the composed LISREL model. Another reason that we chose to conduct multiple regression analyses before using the LISREL test was the profession-specific nature of the job content groups. Therefore, we first needed to explore their contributions (both quantitatively and, with the assistance of the case studies, qualitatively) to generate the test model.

Regression analyses

As testing a total path model is not possible in a regression analysis, we tested our initial model in several steps.

The mediating effect of job complexity in the relationship between job content and job satisfaction, and the mediating effect of role conflict in the same relation (hypothesis 5), were tested according to the procedures of Baron and Kenny (1986). We checked residues for normal deviation, homogenous variation among residues and Cook's distance. First, task groups were used as predictors for job characteristics (job complexity) and role conflict and second, separately job characteristics (job complexity) and role conflict were used as predictors for job satisfaction. The mediating effect of job characteristics in the relation between role conflict and job satisfaction (hypothesis 6) was tested in the same way.

Two moderator tests were performed. In the first test, the roles of role conflict on the relationship between job content and job complexity (hypothesis 7) was explored.

Structural equation model by LISREL

Based on the output of the regression analyses and the qualitative data regarding the high importance of perceived skill variety, autonomy and role conflict for dental hygienists' job satisfaction; we chose the final test model for the structural equation model by LISREL (8.8). To assess the effect of a changed inter-professional context and scope of practice on the relationships between job content, job characteristics and job satisfaction, we performed separate LISREL analyses for each group of dental hygienists (i.e., old style and new style hygienists). This model focuses on the main research objective: to identify the changes in the relationships between job content, experienced job characteristics and job satisfaction between subsamples with different occupational scopes of practice (educational background).

Only the job content groups on which the curricula between old and new style dental hygienists differ were included in the LISREL model. After presenting the results of the regression analysis in Section 5.3.5, we provide theoretical legitimation of the LISREL test model, the variables that were included and the results of the LISREL modeling in section 5.3.6.

We performed a confirmatory factor analysis (CFA) by employing likelihood estimation using LISREL 8.8. The results of the CFA were similar to the previously defined scales that were used in the multiple linear regression analyses. After removing some items according to the results of the CFA, we defined the next task groups for LISREL modeling: 'oral healthcare policy and EBP tasks', 'intake',' caries diagnosis', 'caries decisive tasks', and 'local anesthesia'.

After choosing the constructs and test model, we examined the structural relationships among the constructs with a path analysis using the maximum likelihood estimation procedure in LISREL 8.8.

5.3 Results

In this section, different job content in relation to job complexity and job satisfaction are first described, followed by the analysis of differences in job content, job complexity and job satisfaction in old and new style dental hygienists. Subsequently, the results of the longitudinal sub-study and a comparison between dental hygienists in different work settings are presented. Finally, the results of the two analyses that investigate the relationships between job content, job characteristics and job satisfaction are presented.

5.3.1 Job content in relation with job complexity and job satisfaction

Hypothesis 1: Expanded job content is positively related to job complexity and job satisfaction.

To investigate the relationship between job content and job complexity in groups of dental hygienists with different job content, we performed a cluster analysis for all of the respondents from the old and new style groups (n=595). Based on job content, five clusters could be classified. The post-hoc ANOVA analysis showed significant differences between the clusters in all task groups ($p<0.001$). The discriminant analysis is shown to strongly agree with the identified clusters, as 92.9% of the respondents are members of the same cluster by means of the cluster analysis and the discriminant analysis. Of the respondents, 4.7% are one step away from the initial cluster membership, and the last 2.4% are two steps away from the cluster membership obtained by cluster analysis.

The cluster membership is for 63.4% explained by Function 1 with caries decisive tasks, caries treatment, caries diagnosis, and orthodontics ($p<0.001$) (Table 29). The next 22.8% is explained by Function 2 with two task groups, intake and EBP ($p<0.001$). An additional 10.6% is explained by Function 3 with the activity groups of oral healthcare policy and scientific research ($p<0.001$).

Table 29. Discriminant functions evaluated at group means

	Function		
	1	2	3
	Caries decisive tasks	Intake	Oral healthcare policy
	Caries treatment	EBP	Scientific research
	Caries diagnosis		
Cluster	Orthodontics		
1	-1.823	.392	-1.127
2	-1.479	-2.113	.931
3	-.584	1.577	.760
4	2.724	-.969	-.913
5	5.008	.557	.595

In Table 30, the clusters are described according to the scores of the task groups and the first three functions of the discriminant analysis.

Table 30. Five clusters of respondents according to job content; mean (SD) range 1-5

Task group	Cluster Means (SD)				
	1 n=156	2 n=119	3 n= 163	4 n=101	5 n=56
Intake	4.64 (0.50)	2.32 (0.74)	4.64 (0.61)	3.72 (1.06)	3.95 (0.93)
Prevention	4.85 (0.37)	4.74 (0.47)	4.92 (0.25)	4.78 (0.38)	4.71 (0.57)
Periodontology	4.26 (0.50)	4.05 (0.87)	4.51 (0.41)	4.56 (0.42)	4.46 (0.88)
Orthodontics	1.40 (0.67)	1.48 (0.73)	1.64 (0.66)	1.67 (0.75)	2.18 (0.90)
Local anesthesia	2.89 (1.23)	3.45 (1.08)	3.89 (0.92)	4.36 (0.65)	4.72 (0.45)
Caries diagnosis and treatment planning	2.67 (0.78)	2.67 (0.87)	3.25 (0.72)	3.73 (0.62)	4.18 (0.53)
Caries decision making	1.22 (0.41)	1.38 (0.48)	1.41 (0.50)	3.19 (0.90)	4.15 (0.67)
Caries treatment	1.26 (0.34)	1.49 (0.49)	1.49 (0.50)	3.53 (0.72)	3.87 (0.85)
Extraction	1.05 (0.18)	1.12 (0.31)	1.15 (0.38)	1.47 (0.61)	2.58 (1.05)
Evidence based practice	2.52 (0.74)	2.33 (0.76)	3.33 (0.73)	2.58 (0.74)	3.47 (0.78)
Oral healthcare policy	2.30 (0.92)	2.54 (1.08)	3.94 (0.77)	3.08 (0.94)	4.28 (0.62)
Scientific research	1.15 (0.37)	1.25 (0.54)	2.05 (0.94)	1.36 (0.58)	2.54 (1.18)

With regard to job content, the following five clusters can be defined:

- Cluster 1: dental hygienists from dental hygiene practices with tasks primarily related to intake and traditional tasks in prevention and periodontology

- Cluster 2: dental hygienists with fewer intake tasks but more tasks related to the administration of local anesthesia and oral healthcare policy compared to cluster 1

- Cluster 3: dental hygienists (primarily from dental hygiene practices) with tasks primarily related to intake and traditional tasks in prevention and periodontology combined with tasks in caries diagnosis, oral healthcare policy and Evidence based practice

- Cluster 4: dental hygienists with an increased number of caries diagnosis and treatment tasks in addition to their traditional job content

- Cluster 5: dental hygienists with expanded job content who performing all tasks: traditional tasks as well as caries diagnosis, caries treatment and oral healthcare policy tasks

The main characteristics of the dental hygienists in these clusters are presented in Table 31. There are significantly more old style dental hygienists in clusters 1 through 3 compared with new style dental hygienists, who are more often members of clusters 4 and 5 ($p<0.001$). Only 15.7% of all old style dental hygienists are members of clusters 4 or 5. Clusters 1 and 3 consist of significantly more dental hygienists from dental hygiene practices ($p<0.001$), which are relatively smaller based on the number of treatment chairs. The dental hygienists from clusters 4 and 5 work more hours per week compared with those from the other clusters.

Table 31. Characteristics of the clusters

Characteristics	Clusters					P-value ANOVA test
	1 n=156	2 n=119	3 n= 163	4 n=101	5 n=56	
Individual level						
Age (mean, SD)	39.0 (10.8)	34.4 (10.8)	35.1 (9.2)	29.2 (7.2)	30.8 (9.4)	<0.001
% Old style DHs	82	62	77	35	46	<0.001
% Working in DH practice	60	5	52	7	12	<0.001
% Self-employed	57	17	55	20	23	<0.001
Working hours (mean, SD)	27.6 (8.1)	25.4 (8.6)	30.2 (7.7)	31.1 (6.8)	32.2 (7.9)	<0.001
% Old style DH with additional courses in caries treatment	15.9	19.4	23.4	93.9	92.3	<0.001
Practice level						
n Dentist chairs (mean, SD)	3.4 (3.8)	5.2 (3.7)	3.7 (3.4)	4.5 (3.1)	5.0 (2.9)	<0.001
n Personnel (mean, SD)	10.4 (10.1)	17.9 (14.5)	18.9 (19.3)	15.9 (12.7)	15.0 (8.7)	0.131

According to the JCM, the dental hygienists from clusters 4 and 5 are expected to experience greater job complexity and, therefore, greater job satisfaction when compared with the hygienists from clusters 1 and 2, whose job content is less complex. Table 32 presents the job characteristics and job satisfaction scores for each cluster and the results of the ANOVA test. The post-hoc analysis showed

statistically significant differences between some of the clusters for most of the job characteristics and job satisfaction scales (see Appendix VIII). Only skill variety increases for each cluster: cluster 1 perceives the least variety, and cluster 5 perceives the most skill variety. In terms of perceived autonomy and feedback from the job, clusters 1 and 3 do not significantly differ from one another, but both of these clusters significantly differ from clusters 2 and 4. Overall, the dental hygienists from cluster 2 experience the least amount of job complexity, intrinsic job satisfaction and career satisfaction compared with the dental hygienists from the other clusters. The highest level of extrinsic job satisfaction is found for clusters 1 and 3, which are the clusters with the highest number of dental hygienists from dental hygiene practices (Appendix VIII).

Table 32. Job characteristics and job satisfaction for five clusters; mean (SD) range 1-5

Job characteristic scales	Cluster means (SD)					P-value ANOVA test
	1 n=156	2 n=119	3 n= 163	4 n=101	5 n=56	
Job characteristics						
Skill variety	3.65 (0.77)	3.54 (0.83)	3.88 (0.69)	4.23 (0.72)	4.45 (0.55)	<0.001
Task identity	4.27 (0.51)	4.14 (0.56)	4.36 (0.49)	4.32 (0.48)	4.39 (.47)	0.003
Task significance	4.18 (0.56)	4.09 (0.60)	4.44 (0.50)	4.32 (0.50)	4.53 (0.45)	<0.001
Autonomy	4.54 (0.51)	4.28 (0.56)	4.57 (0.48)	4.30 (0.53)	4.56 (0.49)	<0.001
Feedback from job	4.01 (0.56)	3.83 (0.51)	4.07 (0.54)	3.86 (0.51)	4.02 (0.55)	0.001
Job complexity	4.12 (0.41)	3.98 (0.39)	4.25 (0.36)	4.20 (0.39)	4.40 (0.36)	<0.001
Job satisfaction						
Intrinsic JS	4.24 (0.58)	4.14 (0.58)	4.42 (0.50)	4.36 (0.46)	4.46 (0.48)	<0.001
Extrinsic JS	3.91 (0.87)	3.44 (1.12)	3.86 (1.10)	3.61 (0.98)	3.73 (0.90)	0.001
Career satisfaction	3.91 (0.83)	3.55 (1.02)	4.19 (0.89)	3.93 (0.82)	4.04 (0.71)	<0.001

With respect to our first hypothesis, the cluster analysis and subsequent ANOVA's show that extended job content is related to increased job complexity and greater

job satisfaction. Nevertheless, it should be noted that the differences among some groups are non-significant. The clusters with the largest proportion working in dental hygiene practices without extended tasks in terms of performing caries-related tasks (nr 1 and 3), still perceive a degree of job complexity and job satisfaction similar to that of dental hygienists with more extended job content (nr 4 and 5). Members of clusters with an extended scope of practice (4 and 5) are mostly always new style dental hygienists. Differences in job content, job complexity and job satisfaction between the old and the new style dental hygienists are tested in the second hypothesis.

5.3.2 Job content, job complexity and job satisfaction between old and new style dental hygienists

Hypothesis 2: Compared with old style dental hygienists, new style dental hygienists have more expanded job content, which increases job complexity and job satisfaction, but is also related to a higher level of role conflict and role ambiguity.

Old and new style dental hygienists in our study differ significantly in their job content (Table 9, Section 3.3.4). Old style dental hygienists more often handle intakes and perform preventive tasks, whereas new style dental hygienists perform significantly more tasks related to local anesthesia, caries decision making and caries treatment. The first part of our hypothesis is therefore, confirmed; the new style dental hygienists indeed have more expanded job content compared with the old style group.

There are also statistically significant differences in perceived job characteristics, role conflict and job satisfaction between old and new style dental hygienists (Table 33). The old style dental hygienists experienced higher levels of autonomy compared with the new style hygienists. The other four job characteristics are perceived similarly by both groups. The possible explanation for the higher levels of perceived autonomy for the old style dental hygienist group is that a higher number of dental hygienists work in dental hygiene practices in which they perform tasks that allow a significantly greater degree of autonomy (such as intake tasks).

The small differences in perceived job characteristics correspond with small differences in job satisfaction. Compared with the new style dental hygienists, the old style dental hygienists are, on average, more satisfied with their jobs. Moreover, on average, the new style dental hygienists experience more role conflict in their jobs compared with the old style dental hygienists, which is in line with our expectations regarding the increased role conflict in this population. Although several of the differences are small, they occur consistently in the same direction and are all significant. Thus, we may conclude that the new style group generally perceives less job complexity and is less satisfied; therefore, this part of the hypothesis 2 is rejected. One of our next hypotheses tests the moderating effect of

role conflict on the relation between job content and job complexity, what may possibly explain the difference in job content and perceived job complexity between these two subpopulations.

Table 33. Job characteristics and job satisfaction of old and new style dental hygienists; mean (SD) range 1-5

Job characteristics and job satisfaction scales	Old style Mean (SD) n=412	New style Mean (SD) n=219	T-test P value
Job characteristics			
Skill variety	3.8 (0.77)	3.9 (0.83)	0.420
Task identity	4.3 (0.53)	4.2 (0.48)	0.058
Task significance	4.3 (0.55)	4.3 (0.57)	0.901
Autonomy	4.5 (0.51)	4.3 (0.54)	<0.001
Feedback from job	4.0 (0.56)	3.9 (0.51)	0.109
Job complexity	4.2 (0.40)	4.1 (0.41)	0.091
Role conflict and role ambiguity			
Role conflict	1.5 (0.55)	1.7 (0.59)	0.001
Role ambiguity	1.6 (0.54)	1.7 (0.53)	0.034
Job satisfaction			
Intrinsic job satisfaction	4.4 (0.50)	4.2 (0.60)	<0.001
Extrinsic job satisfaction	3.8 (1.02)	3.6 (1.02)	0.033
Career satisfaction	4.0 (0.89)	3.8 (0.90)	0.013

5.3.3 Job content and perceived job characteristics for new style dental hygienists – paired measurements

Hypothesis 2: Over a two-year period, the job content of newly graduated dental hygienists expands, and their perceived job complexity increases, but their job satisfaction remains static.

In total, 50 pairs from the sample of new style dental hygienists were identified (Table 34). The comparisons are based on the data of 48 respondents; for 33 respondents data from the same practice were available at T1 and T2, and for 15 respondents data from different practices at T1 and T2 were used.

Table 34. Paired measurements – response

T1	T2
50	2 not active as dental hygienist but studying dentistry
	8 do not remember whether they participated in the earlier study or do not remember the practice for which they completed the questionnaire; they completed questionnaire for their current job
	7 no longer work in the practice from T1, but completed the questionnaire for their current job
	33 work in same practice and completed the questionnaire for practice from T1

There are no significant differences in the job content of dental hygienists between T1 and T2 (Table 35). After 3 years of experience, the job content of new style dental hygienists in 2009 was similar to their job content one year following their graduation.

Table 35. Job content in paired measurements for the new style dental hygienist group; mean (SD) range 1-5, n=48

Task groups	T1 mean (SD)	T2 mean (SD)	Mean change (sd), (range)	P-value paired t-test
Intake	3.6 (1.25)	3.8 (1.13)	.15 (1.11) (-2.50, 2.50)	0.368
Prevention	4.8 (0.35)	4.7 (0.74)	-.17 (.80) (-4.00, 1.25)	0.161
Periodontology	4.2 (0.92)	4.4 (0.82)	.20 (.82) (-1.43, 3.86)	0.099
Orthodontics	1.6 (0.71)	1.7 (0.79)	.05 (.48) (-1.00, 1.50)	0.459
Local anesthesia	4.4 (0.79)	4.3 (0.93)	-.11 (1.06) (-.4.00, 2.50)	0.478
Caries treatment	2.7 (1.23)	2.7 (1.33)	.00 (1.10) (-3.00, 2.46)	0.984
Caries decision tasks	2.4 (1.26)	2.5 (1.37)	.16 (1.34) (-.3.71, 3.00)	0.402
Caries diagnosis and treatment planning	3.1 (0.99)	3.3 (0.88)	.21 (.90) (-.1.33, 2.17)	0.115
Extraction	1.2 (0.36)	1.4 (0.62)	.23 (.55) (-.75, 2.25)	0.006

Task groups	T1 mean (SD)	T2 mean (SD)	Mean change (sd), (range)	P-value paired t-test
Evidence based practice (EBP)	2.9 (1.01)	2.8 (0.89)	-.03 (.82) (-1.67, 2.33)	0.816
Oral healthcare policy	2.9 (1.15)	3.3 (0.92)	.38 (1.05) (-2.25, 3.00)	0.017
Scientific research	1.7 (0.83)	1.8 (0.93)	.14 (1.14) (-2.67, 3.33)	0.402

Consistent with the stable job content results, no statistically significant differences were found between T1 and T2 in perceived job complexity and job satisfaction scales; thus, these results support the claim of the JCM that changes in job content are necessary to improve job complexity (Table 36). The paired t-test with the factor scores of job characteristics also failed to show any significant difference over time.

Table 36. Paired measurements of job characteristics and job satisfaction scales for the new style dental hygienist group; mean (SD) range 1-5, n=48

Job characteristic scales	T1 mean (SD)	T2 mean (SD)	P-value paired t-test
Job characteristics			
Skill variety	3.8 (0.83)	3.8 (0.85)	0.887
Task identity	4.1 (0.43)	4.2 (0.47)	0.676
Task significance	4.2 (0.54)	4.3 (0.54)	0.355
Autonomy	4.1 (0.53)	4.2 (0.57)	0.347
Feedback from job	3.9 (0.39)	3.9 (0.48)	0.647
Job complexity	4.0 (0.36)	4.1 (0.39)	0.397
Job satisfaction			
Intrinsic job satisfaction	4.2 (0.57)	4.3 (0.54)	0.858
Extrinsic job satisfaction	3.6 (0.99)	3.6 (1.03)	0.907
Satisfaction with career	3.8 (0.71)	3.8 (0.82)	0.809

Although no significant changes were found in dental hygienists' job content between T1 and T2, small changes in job content were found for all dental hygienists in our paired sample. The range of the changes that were found, show changes in both directions, as the job content for dental hygienists both expands

and narrows. The question arises as to whether these changes in job content are related to increased job complexity. Therefore, we calculated the correlations between the changes in task groups and changes in job characteristics, overall job complexity and job satisfaction scales.

Table 37 presents only the statistically significant correlations between the variables over time (see Appendix IX for the full correlation matrix for all variables over time). Positive correlations between caries treatment tasks, caries decision tasks and EBP tasks and perceptions of job complexity were found. The respondents who performed these tasks more often in 2009 than in 2007 scored higher on job complexity in 2009 than in 2007. The increase in overall job complexity was only due to the increase in perceived skill variety among dental hygienists who performed these tasks more often in 2009 than in 2007 (Table 37). Performing more administrations of local anesthesia and applied research tasks increases the experienced task significance.

Table 37. Statistically significant correlations between task groups and dependent variables at T2-T1 (n=48)

Task groups	Skill variety	Task significance	Job complexity
Caries treatment	.333(*)		.359(*)
Caries decision tasks	.356(*)		.377(**)
EBP	.494(**)		.289(*)
Local anesthesia		.379(**)	
Scientific research		.368(**)	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

In summary, job complexity is positively influenced by increases in extended tasks but not by increases in traditional tasks that are performed by the group of new style dental hygienists. Furthermore, the increase in overall job complexity is only due to the increased skill variety that results from the performance of these tasks. Increased tasks related to the administration of local anesthesia and scientific research tasks seems to positively influence task significance; but this is not expresses in a significant correlation with job complexity. No significant correlations were found between other job characteristics and task groups.

In conclusion, at a group level, our third hypothesis is rejected; no significant changes in job content, job complexity and job satisfaction occurred in the new style group over a two-year period. However, at an individual level, we found changes in job content in both directions, as the job content of dental hygienists expanded and reduced.

5.3.4 Differences in job content and perceived job characteristics in different work settings

Hypothesis 4: Dental hygienists from dental hygiene practices have less extended job content, which is related to lower role conflict, role ambiguity, job complexity and job satisfaction compared with dental hygienists in other settings.

As presented in Section 5.3.1, the high number of dental hygienists working in dental hygiene practices was found in two of the five clusters. A sub-analysis of the differences between the dental hygienists from dental hygiene practices and the dental hygienists from other work settings was performed to find alternative explanations for differences found between clusters and between the old and new style dental hygienists.

This analysis revealed some differences in job content. We found significant differences in eight of the twelve task groups (Table 38). The dental hygienists from dental hygiene practices engage significantly more often in intake and prevention tasks, whereas the dental hygienists in other work settings performed significantly more orthodontics, local anesthesia, extraction and caries-related tasks.

Table 38. Job content in different work settings

Task groups Mean (SD) Range 1-5	Work setting		P-value
	Dental hygiene practices, n=200	Other work settings, n=414	
Intake	4.8 (0.49)	3.5 (1.19)	<0.001
Prevention	4.9 (0.23)	4.8 (0.54)	<0.001
Periodontology	4.3 (0.41)	4.3 (0.80)	0.780
Orthodontics	1.4 (0.45)	1.7 (0.85)	<0.001
Local anesthesia	3.3 (1.21)	3.9 (1.11)	<0.001
Caries diagnosis and treatment planning	2.8 (0.79)	3.3 (0.94)	<0.001
Caries decision making	1.3 (0.74)	2.2 (1.22)	<0.001
Caries treatment	1.4 (0.69)	2.3 (1.21)	<0.001
Extraction	1.2 (0.59)	1.4 (0.66)	0.001
Evidence based practice (EBP)	2.8 (0.78)	2.8 (0.91)	0.351
Oral healthcare policy	3.1 (1.28)	3.1 (1.11)	0.991
Scientific research	1.5 (0.82)	1.6 (0.93)	0.262

We also found significant differences between both groups of dental hygienists in role conflict, perceived job characteristics and job satisfaction. Although the dental hygienists from dental hygiene practices generally had less extended job content, they perceived significantly more autonomy and feedback from their jobs (Table

39). Moreover, they experienced significantly less role conflict and were more satisfied with their incomes and careers.

Table 39. Perceived job characteristics in different work settings

Job characteristic scales	Work setting		t-test P-value
	Dental hygiene Practices, n=200	Other work settings, n=414	
Job characteristics			
Skill variety	3.8 (0.75)	3.9 (0.80)	0.131
Task identity	4.4 (0.48)	4.2 (0.53)	0.020
Task significance	4.3 (0.56)	4.3 (0.53)	0.384
Autonomy	4.7 (0.44)	4.3 (0.54)	<0.001
Feedback from job	4.1 (0.57)	3.9 (0.52)	<0.001
Job complexity	4.2 (0.38)	4.1 (0.41)	0.001
Role conflict and role ambiguity			
Role conflict	1.4 (0.46)	1.7 (0.59)	<0.001
Role ambiguity	1.6 (0.62)	1.6 (0.49)	0.819
Job satisfaction			
Intrinsic JS	4.4 (0.54)	4.3 (0.53)	0.012
Extrinsic JS	4.2 (0.79)	3.5 (1.06)	<0.001
Career satisfaction	4.2 (0.87)	3.8 (0.88)	<0.001

To explain these differences, we examined the characteristics of the group of hygienists working in different work settings and their employment arrangements. Most dental hygienists working in dental hygiene practices are old style dental hygienists (86%). Among all of the old style dental hygienists, 42.8% work the highest number of hours in dental hygiene practices compared with 13.3% of the new style population (p<.001) (Table 40). Of the 42.8% of old style dental hygienists who work the highest number of hours in dental hygiene practices, 91.9% are self-employed compared with 35.7% of the new style self-employed dental hygienists in dental hygiene practices (p<0.001); thus, most old style dental hygienists working in dental hygiene practices own these practices and, as managers, independently determine their practice policies.

In our study, we found support for the first part of our hypothesis 4 concerning the less extended job content among dental hygienists in dental hygiene practices. The findings regarding the lower role conflict in this group is in line with the expectations. The second part of the hypothesis 4 is rejected; in fact the results show significant relation in the opposite direction, that is, dental hygienists from dental hygiene practices perceive higher levels of job complexity and intrinsic job

satisfaction. This result can be explained by an additional factor that surfaced in our analysis—self-employment. The dental hygienists who work in dental hygiene practice are largely the owners/managers of these practices.

Table 40. Work settings and employment arrangements of old and new style groups

Population	Old style (n=402) %			New style (n=211) %			P-value
Employment arrangement	% DH Pract.	% other setting	Total %	% DH. Pract.	% other setting	Total %	Chi – square test
Self-employed	91.9	17.8	4.5	35.7	14.2	17.1	<.001
In employment	7.0	70.0	43.0	57.1	75.4	73.0	<.001
Commission on turnover	1.1	12.2	7.5	3.6	9.3	8.5	.864
Other	0	0	0	3.6	1.1	1.4	
Total n (%)	172 (42.8)	230 (57.2)	402 (100)	28 (13.3)	183 (86.7)	211 (100)	<.001

5.3.5 Testing integrated test of model by means of linear regression analyses

By means of linear regression analysis, we examined the relationship between job content, job characteristics and job satisfaction. The following hypotheses were tested in these analyses:

Hypothesis 5: The relation between job content and job satisfaction is mediated by job complexity and role conflict.

Hypothesis 6: The relation between role conflict and job satisfaction is mediated by job characteristics.

Hypothesis 7: Role conflict moderates the relation between job content and job complexity.

Because of the ongoing task delegation and struggle for jurisdiction between Dutch dentists and dental hygienists (Section 1.2.2), we included the work environment variables of role conflict and role ambiguity in the model and tested the effect of these variables in different ways. Mono-disciplinary practice and self-employment were also used as predicting variables in the regression models to explain the experienced job complexity and job satisfaction that resulted from large differences in job content between dental hygienists in different work settings and large differences in employment arrangements between old style and new style dental hygienists. The results of the analyses of extrinsic and career satisfaction are also presented in this section; however, we focus on intrinsic job satisfaction as the

main dependent variable. Figure 20 presents the initial model, and Figure 22 presents the finalized model with intrinsic job satisfaction as a dependent variable. In these analyses we controlled for age and experience.

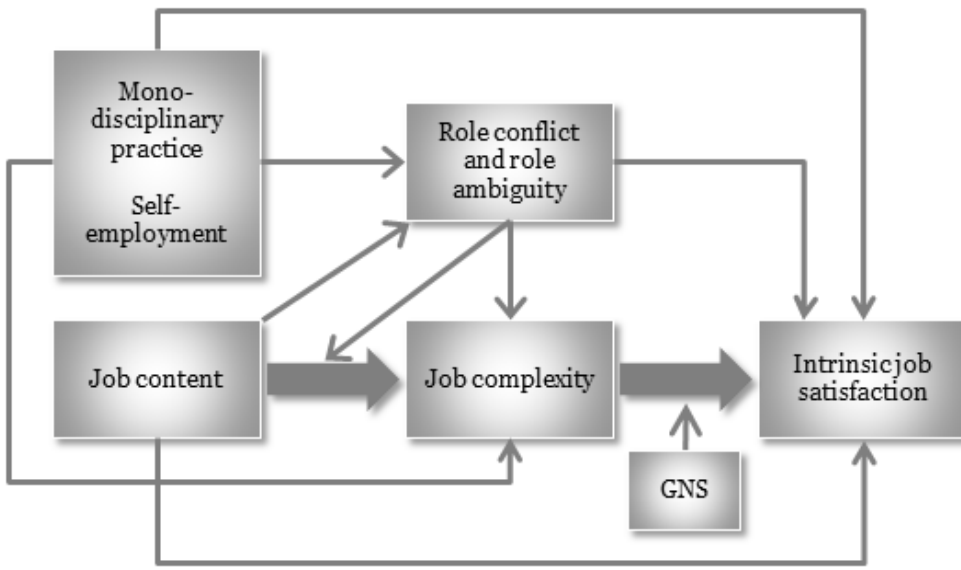


Figure 20. Test model I

By means of multiple regression analysis, we found that 14% of job complexity is predicted by tasks in oral healthcare policy and intake tasks ($F = 8.119$, $df=12, 526$, $p<0.05$) (Table 41). Table 43 presents the results of the multiple regression analysis of separate job characteristics and job complexity as dependent variables and task groups as independent variables. The results show that skill variety is primarily explained by caries treatment, oral healthcare policy and orthodontic tasks. Autonomy is explained by six task groups in this model; orthodontics, caries treatment and local anesthesia tasks are negatively related to perceived autonomy.

Table 41. Multiple regression models for job complexity and single job characteristic scales in relation to job content

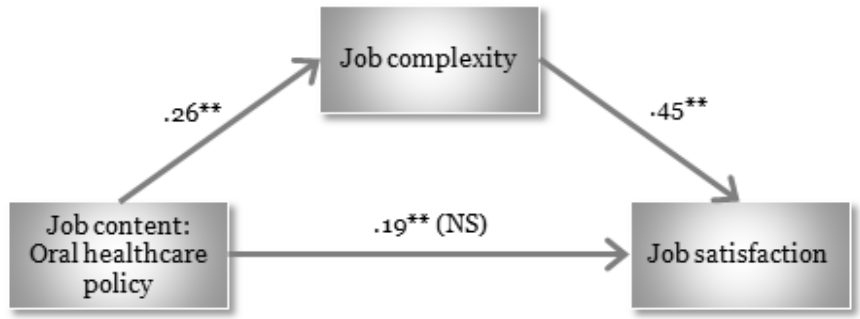
Dependent variables	Significant Predictor(s)	Beta	P-value	Adj. R^2	F (df)
Overall job complexity	Oral healthcare policy	.232	<.001	.140	8.119
	Intake	.132	.004		(12, 526)
Skill variety	Caries treatment	.183	.014	.157	9.797
	Oral healthcare policy	.109	.018		(12, 566)
	Orthodontics	.112	.007		

Dependent variables	Significant Predictor(s)	Beta	P-value	Adj. R^2	F (df)
Task identity	Periodontology	.167	.003	.058	4.023
	Oral healthcare policy	.123	.011		(12, 587)
	Intake	.093	.039		
Task significance	Oral healthcare policy	.281	<.001	.123	7.709 (12, 575)
Autonomy	Intake	.155	<.001	.142	8.974
	Oral healthcare policy	.196	<.001		(12, 580)
	Orthodontics	-.126	.002		
	Periodontology	.176	.001		
	Caries treatment	-.241	.001		
	Anesthesia	-.102	.027		
Feedback from job	Intake	.094	.037	.040	3.035 (12.586)

To test the mediating role of job complexity in the relationship between job content and job satisfaction (hypothesis 5), we first attempted to determine the extent to which the job satisfaction variance could be attributed to differences in job content. Table 42 presents the results of a multiple regression analysis in which the twelve task groups are used as regressors to explain the criteria for job satisfaction. We observe that the regression fits are significant but rather poor for all job satisfaction scales (adj. R^2=5.1%, 4.2% and 8.3% for intrinsic, extrinsic and career satisfaction, respectively) (Table 42). As expected, according to the JCM, overall job complexity mediates the relationship between job content and job satisfaction, which supports our hypothesis 5. When job complexity is integrated into the model, the influence of oral healthcare policy tasks on job satisfaction becomes insignificant (Figure 21).

Table 42. Multiple regression models for job satisfaction scores as dependent variables and task groups (job content) as independent variables

Dependent var.	Significant Predictor(s)	Beta	P-value	Adj. R^2	F (df)
Intrinsic job satisfaction	Oral healthcare policy	.195	<.001	.051	3.423 (12,598)
Extrinsic job satisfaction	Intake	.163	<.001	.042	3.162 (12,598)
	Extraction	.120	.023		
	Caries diagnosis	-.163	.002		
	Oral healthcare policy	.107	.025		
Career satisfaction	Oral healthcare policy	.285	<.001	.083	5.529 (12,598)
	Intake	.144	.001		



* p<0.005
** p<0.001

Figure 21. The mediating effect of job complexity in the relationship between task groups and intrinsic job satisfaction with standardized beta coefficients

Interestingly, the results show that role conflict is significantly related to all three job satisfaction variables and to job complexity. Furthermore, in all four models, role conflict is negatively related to the dependent variables, whereas the other variables have a positive relationship with the dependent variables (Table 43). We found that the relationship between role conflict and job satisfaction is not, or only to a limited extent mediated by job complexity, which rejects hypothesis 6; role conflict remains a significant predictor for job satisfaction when job complexity is included in the regression analysis. Intrinsic job satisfaction is for 30 % explained by job complexity and role conflict as significant predictors (F=38.120 df =6, 517 p<0.001) (Table 43). Role conflict itself is for 9% explained by prevention tasks and self-employment (F=5.320, df=14, 583, p=.003), and according to our regression analysis, role conflict does not moderate the relationship between job content and job complexity, which makes our hypothesis 7 rejected. We found self-employment to be a positive predictor only for extrinsic job satisfaction (Table 43).

Table 43. Finalized regression models for job complexity and job satisfaction scales with job content, job complexity, work setting, self-employment and work environment variables as predictors

Dependent v.	Significant Predictor(s)	Beta	P-value	Adj. R^2	F (df)
Job complexity	Role ambiguity	-.287	<.001	.283	34.534 (6, 510)
	Oral healthcare policy	.275	<.001		
	Role conflict	-.182	<.001		
	Intake	.146	.001		
Intrinsic job satisfaction	Job complexity	.445	<.001	.301	38.120 (6, 517)
	Role conflict	-.162	<.001		
Extrinsic job satisfaction	Self-employment	.199	<.001	.217	16.685 (9, 510)
	Job complexity	.190	<.001		
	Role conflict	-.166	<.001		
	Caries diagnosis	-.118	.014		
Career satisfaction	Job complexity	.326	<.001	.264	27.083 (7, 510)
	Role conflict	-.197	<.001		
	Oral healthcare policy	.138	.001		

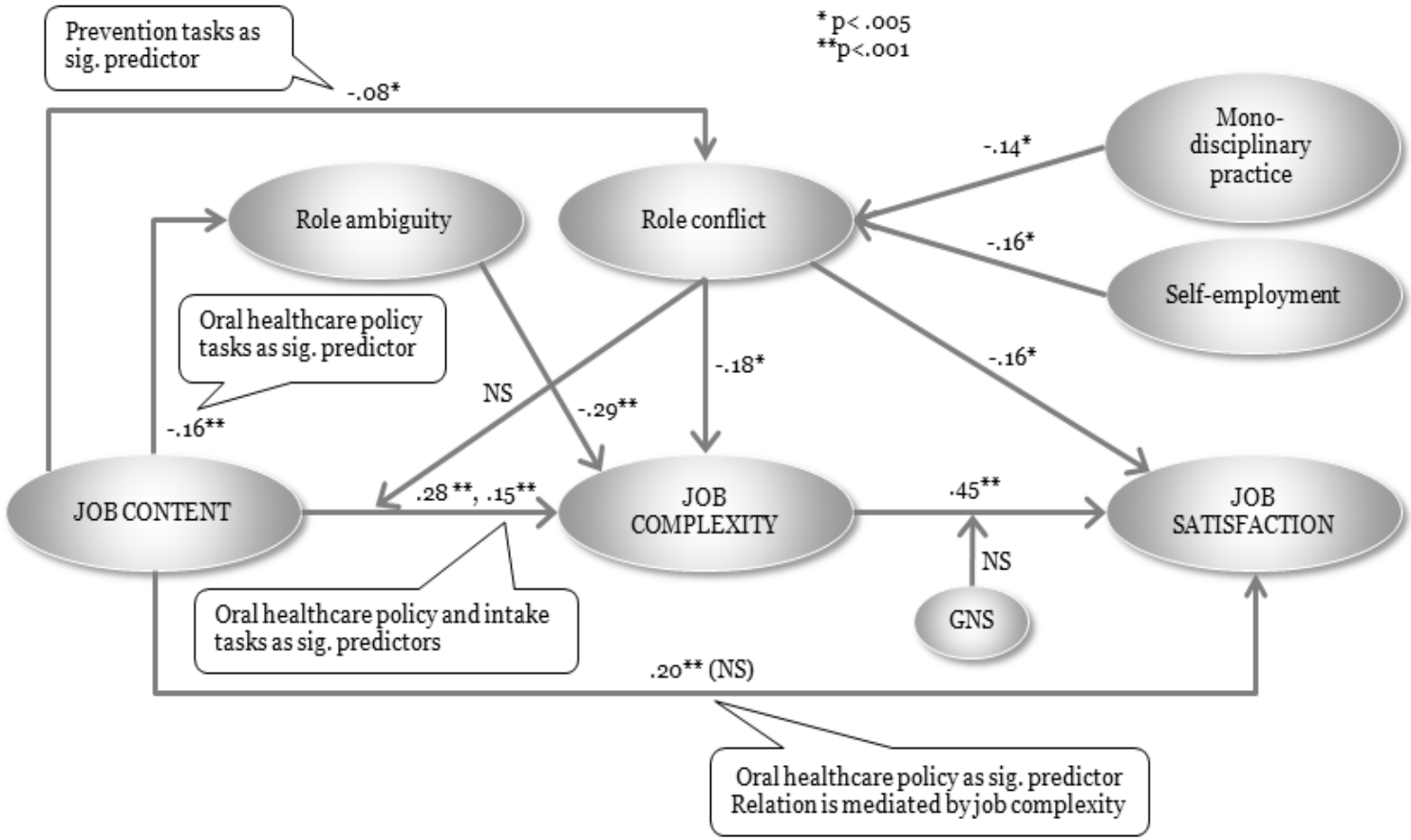


Figure 22. The finalized/resulting model of the job content, job complexity and job satisfaction of dental hygienists with standardized beta coefficients

Overall, job complexity is a strong predictor of job satisfaction. At a more detailed level of single job characteristics within overall job complexity, only skill variety, autonomy and job feedback are significant predictors of job satisfaction. Because extended scopes of practice were found to affect skill variety and autonomy differently (Section 5.3.1.), Figures 23 and 24 present the regression models with the dependent variables of skill variety and autonomy separately for the old and new style dental hygienists. The regression model for the job characteristic of feedback is presented in Appendix X. We found consistent relationships, but the contribution of job content groups and the size of the effects appear to be dependent on educational background. In addition to identifying several task groups as significant predictors of skill variety and autonomy (Table 43), we found that both skill variety and autonomy are related to role conflict and role ambiguity. Furthermore, self-employment is a significant predictor of perceived autonomy (Figure 25) for the old style group.

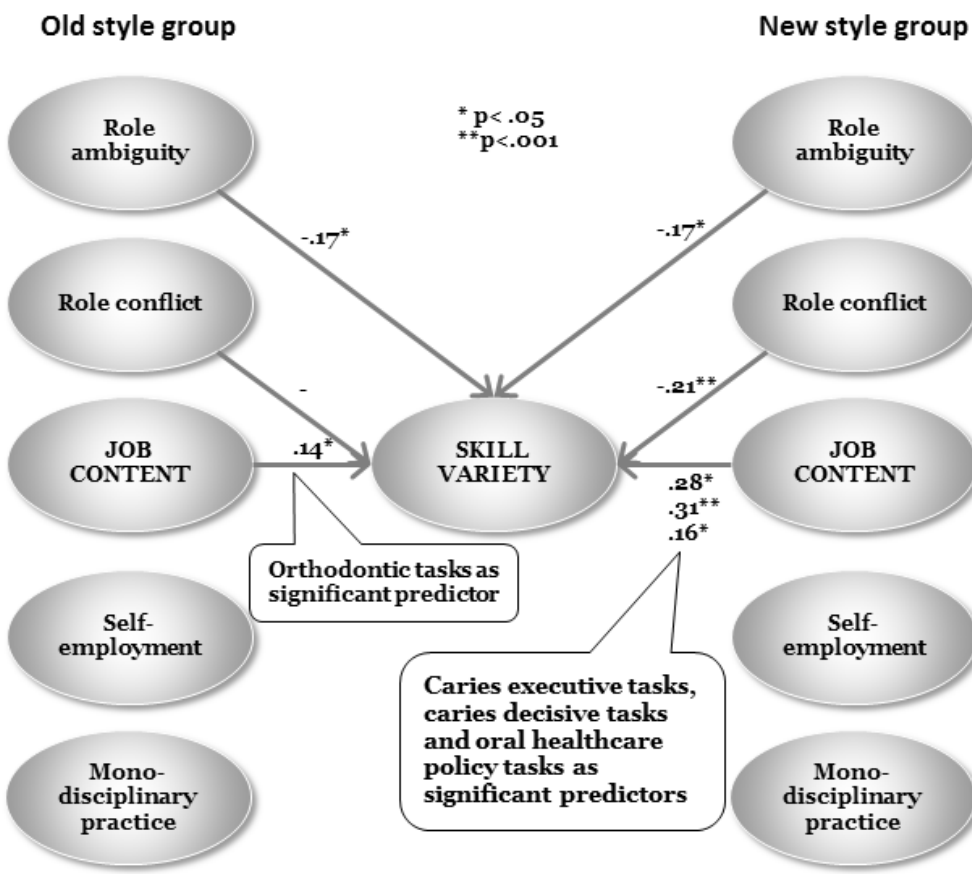


Figure 23. Explained variance for skill variety using task groups, work environment, work setting and self-employment as predictors
Old style group: R^2=19.4, F=4.907, df=16, 343, p<.001;
New style group: R^2=40.7, F=7.735, df=16, 196, p<.001

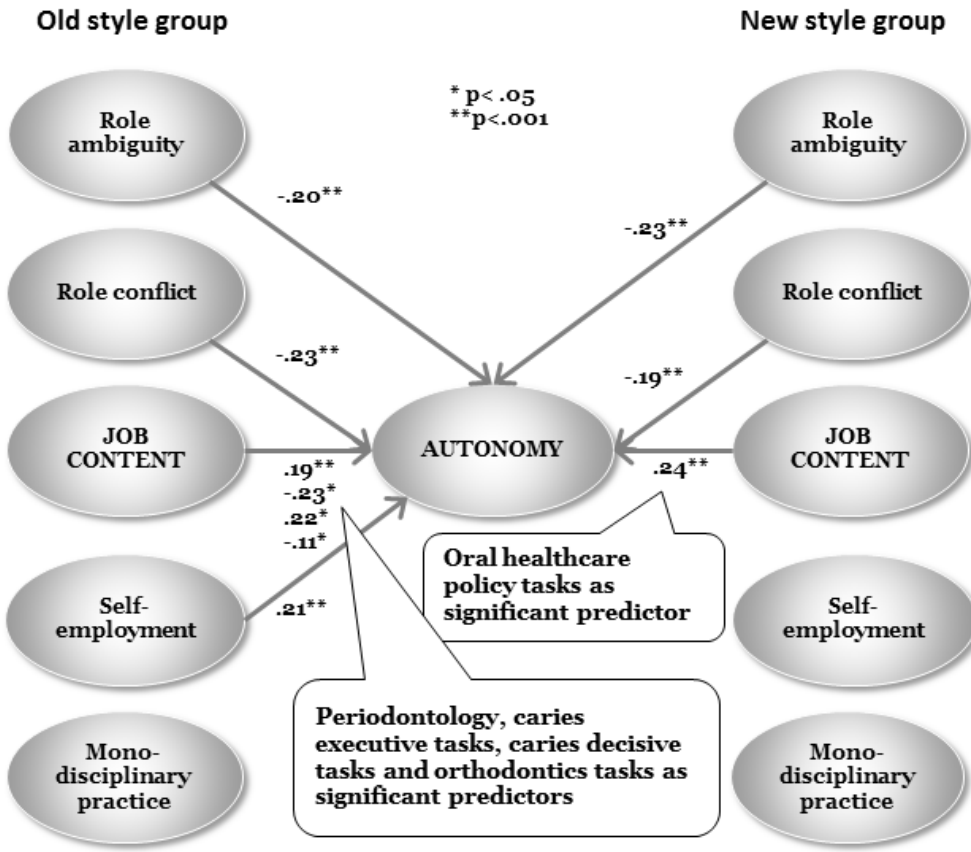


Figure 24. Explained variance for autonomy using task groups, work environment, work setting and self-employment as predictors

Old style group: R^2=34.7, F=11.204, df=16, 353, p<.001
New style group: R^2=26.8, F=4.233, df=16, 201, p<.001

5.3.6 Integrated test of model by means of structural equation modeling

Figure 25 displays the test model of our structural equation model that focuses on the integration of role conflict into the JCM and the relationship between changed job content and perceptions of job characteristics and job satisfaction, testing our hypotheses 5, 6, and 7. We now describe the manner in which we chose the test model using the findings from the regression analyses.

First, to address the inter-professional setting and integrate insights from Abbott's theory on systems of professions in the JCM, we included the variable of role conflict in the test model. Although role ambiguity was also a significant predictor of several dependent variables, we decided not to include this variable in the

LISREL model because there was no difference between old and new style dental hygienists with respect to this variable and because of our focus on the inter-professional context in this research.

Second, there were two reasons that we chose to only test relationships between skill variety and autonomy rather than job complexity. First, these two job characteristics explained the highest amount of variance in job satisfaction among the five job characteristics. Furthermore, we found that the dental hygienists with extended scopes of practice perceived greater skill variety and less autonomy compared to those with narrower scopes of practice who perceived less skill variety but greater autonomy (Section 5.3.1). Therefore, we separately assessed the relationship between job content and the characteristics of skill variety and autonomy. The use of the composed job complexity score would neglect these differential effects on these separate job characteristics.

Third, the regression analysis revealed that the orthodontics and periodontology task groups were significant predictors of skill variety and autonomy, respectively, for the old style group. However, these task groups were not included in the LISREL model because of our focus on the new extended tasks and the tasks that are relevant in the inter-professional context. Periodontology tasks are performed by all groups of dental hygienists equally and with high frequencies. However, orthodontic tasks are seldom performed in general dental practices or dental hygiene practices, which are the focus of our study.

Fourth, self-employment was included as an independent variable because of the clear differences in the degree of role conflict between the self-employed and employed respondents. There is a high degree of overlap between this variable and variable mono-disciplinary practice (dental hygiene practice), as most dental hygienists who work in these mono-disciplinary practices are self-employed. Therefore, we selected only one of these two variables. Moreover, self-employment was also a significant predictor of role conflict in the regression analysis.

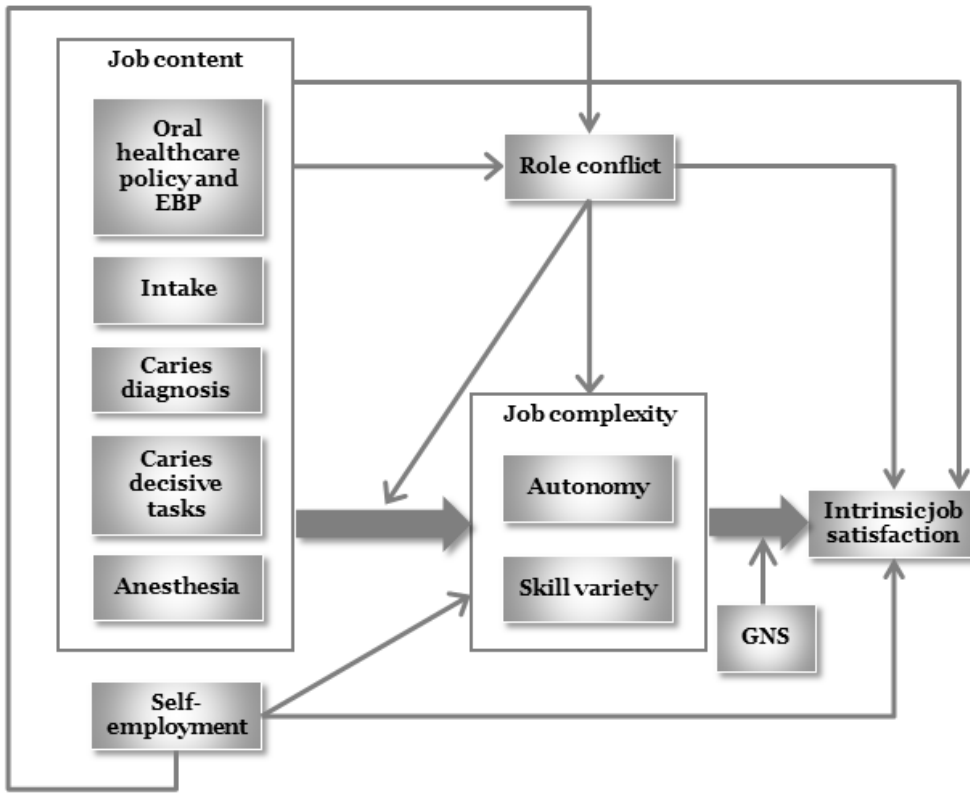


Figure 25. Test model II

The descriptive statistics and correlations for the constructs in our model are presented in Table 44. Significant differences between the scores of the old and new style groups were found in the frequency of performing intakes (higher in old style group), caries decisive tasks and local anesthesia tasks (higher in new style group). Significant differences were also found in perceived job characteristics and job satisfaction, as the old style hygienists tend to report a greater degree of job autonomy and greater job satisfaction, whereas the new style group tends to report a significantly higher level of role conflict in their jobs.

Table 44. Descriptive statistics, correlations and Cronbach's alpha values (N=564)

Scales	Mean (sd) Old style	Mean (sd) New style	P-value old vs. new	OHP/ EBP	IN	DI	CA	AN	SE	VAR	AUT	RCO	JS
Oral healthcare policy and EBP	3.2 (1.02)	3.1 (.98)	.225	.75#									
Intake	4.1 (1.08)	3.6 (1.28)	<.001	.218**	.72#								
Caries diagnosis	3.3 (1.09)	3.4 (1.11)	.131	.267**	.168**	.72#							
Caries decisive tasks	1.5 (1.06)	2.4 (1.44)	<.001	.137*	-.082*	.404**	.95#						
Local anesthesia	3.2 (1.21)	3.9 (1.06)	<.001	.197**	.046	.245**	.414**	.81#					
Self-employment (%)	49.5%	16.3 %	<.001	.117**	.336**	-.052	-.214**	-.190**	---				
Skill variety	3.8 (.81)	3.9 (.87)	.146	.221**	.033	.242**	.330**	.171**	-.150	.85#			
Autonomy	4.5 (.50)	4.3 (.54)	<.001	.205**	.224**	.080	-.043	-.050	.340**	.250**	.85#		
Role conflict	1.5 (.58)	1.7 (.64)	<.001	.086*	-.089*	.087*	.195**	.158**	-.245**	-.069	-.295**	.78#	
Job satisfaction	4.3 (.53)	4.2 (.65)	<.001	.214**	.109**	.108*	.402	.068	.118**	.504**	.339**	-.246**	.85#

* P<.05

** P<.01

The figures on the diagonal line represent Cronbach's alpha values

The Cronbach's alpha values for our nine constructs ranged from .72 to .95, which were high values. Appendix XI presents the measurement models based on the CFA and Cronbach's alpha for each of the nine constructs in the sample. The measurement model had a good fit with χ^2=833.81, df=398, RMSEA=.046, NFI=.95, CFI=.97, and GFI=.91. All of the loadings for the respective constructs are significant (p<.01), and the standardized loadings of the items were greater than .35, which demonstrates satisfactory convergent validity in our data file with n=564 (Hair, Anderson, Tatham & Black, 1998). Discriminant validity is satisfactory, as all phi values (+3 x sd) are below 1.

The path coefficient estimates resulting from the final analyses are presented in Figure 26 for the old style group and in Figure 27 for the new style group. The final model fit for both groups was good: the model fit for the old style group was at χ^2= 39.50, df= 11, RMSEA= 0.084, NFI= 0.96, CFI= 0.96, and GFI= 0.99; and the model fit for the new style group was at χ^2= 73.41, df= 20, RMSEA= 0.11, NFI= 0.93, CFI= 0.94, and GFI= 0.97. The results that are presented in both Figures partially support our conceptual test model and show some differences in the relationships that were found for each of the sub-samples of professionals.

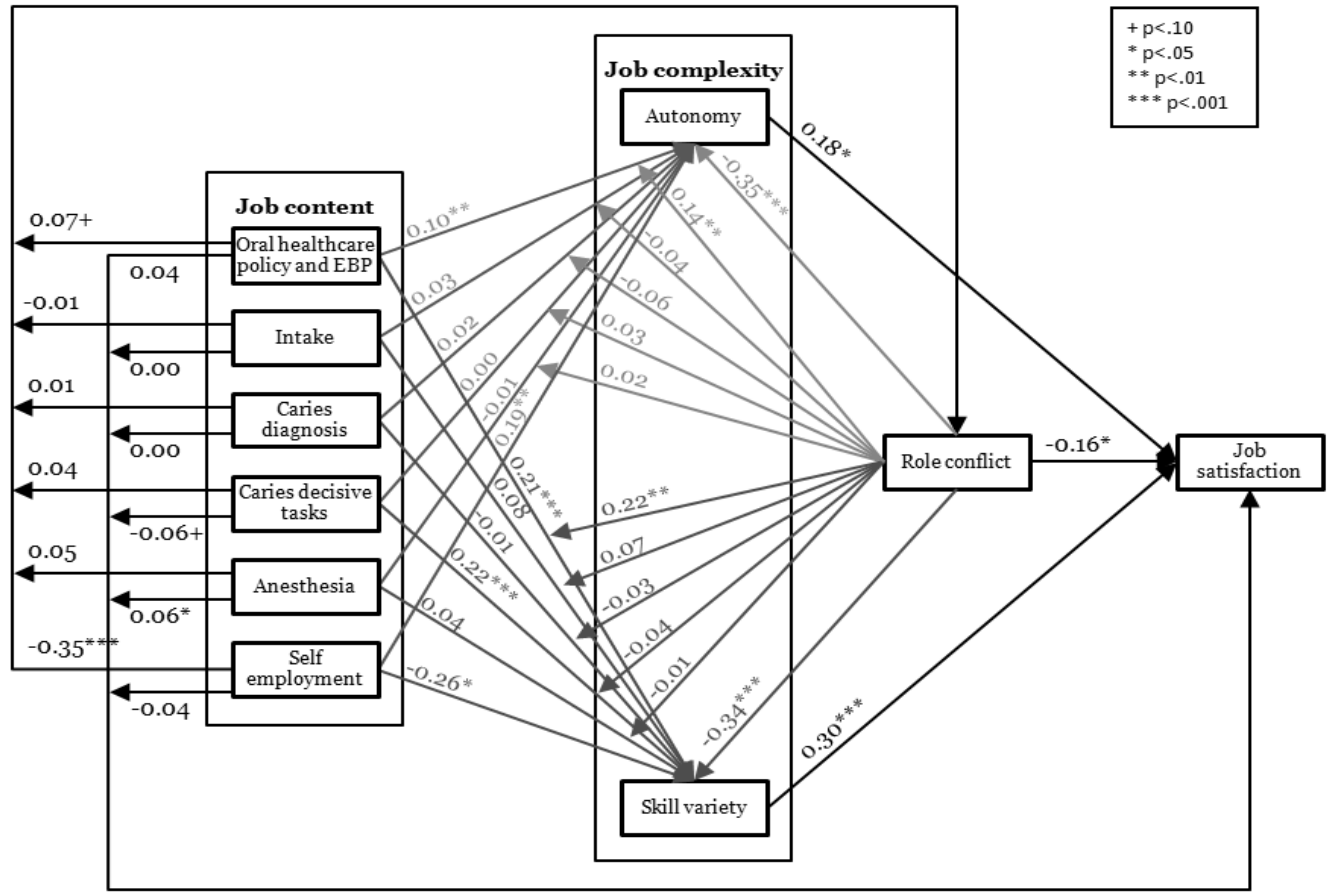


Figure 26. Standardized path coefficients of the conceptual model for the old-style group (χ^2= 39.50, df= 11, RMSEA= 0.084, NFI= 0.96, CFI= 0.96, GFI= 0.99)

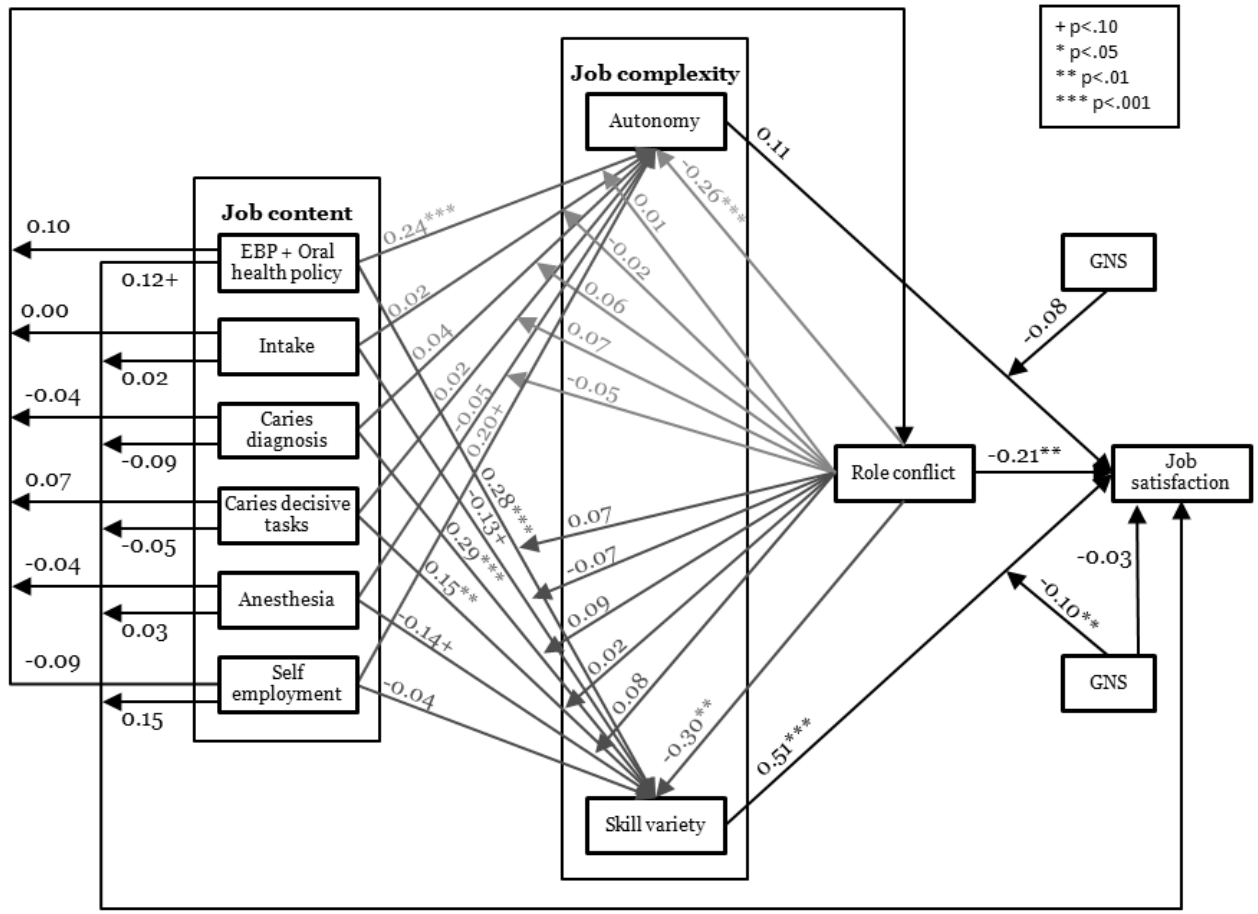


Figure 27: Standardized path coefficients of the conceptual model for the new style group (χ^2= 73.41, df= 20, RMSEA= 0.11, NFI= 0.93, CFI= 0.94, GFI= 0.97)

Relationship: job content → skill variety, autonomy → job satisfaction

With regard to job content, we found that the oral healthcare policy and EBP task group positively affects skill variety and autonomy for both groups, whereas the other task groups are differentially related to these job characteristics for the old and new style groups. Intakes and local anesthesia tasks appeared to negatively affect the skill variety of the new style group (β= -.13 and -.14; p=.10), whereas caries diagnosis and caries decisive tasks are positively related to skill variety for this group (β=.29 and .15; p<0.01). Caries decisive tasks are also positively related to skill variety for the old-style group (β=.22; p=.001). Overall, only caries decisive tasks have a strong positive effect on skill variety, and oral healthcare policy tasks have a strong positive effect on autonomy for both groups.

With regard to job complexity, the results are in the expected direction for skill variety, which is directly related to job satisfaction for both groups (β=.30 for the old style group and .51 for the new style group; p<.001). However, autonomy positively contributes to job satisfaction only in the old style group (β=.18, p<0.05), and it is not a significant predictor of job satisfaction in the new style group.

We found a weak direct positive relationship between local anesthesia tasks and job satisfaction (β=.06, p<.05) and a weak negative relationship between decisive caries tasks and job satisfaction (β=-.06, p<.10) for the old style group. The job satisfaction of the new style dental hygienists is positively affected by oral healthcare policy and EBP tasks (β=.12, p<.10). These findings reject our hypothesis 5 that suggests complete mediation by perceived job characteristics (job complexity) in the relation between job content and job satisfaction.

The effect of role conflict on the relations in the JCM

In both groups, we found a strong, direct, and negative relationship between role conflict and the job characteristics skill variety and autonomy (β=-.34 and -.35, respectively, p<0.01 for the old style group; and β=-.30 and -.26, respectively, p<0.01 for the new style group). Moreover, role conflict also has a direct, negative relation with job satisfaction for both groups: (β= -.16 (p<0.01) for the old style group and β=-.21 (p<0.05) for the new style group). The relation between role conflict and job satisfaction is not mediated by job characteristics skill variety and autonomy, which is in line with the findings from the regression analysis rejecting our hypothesis 6.

For the new style group, none of the task groups are significantly related to role conflict. For the old style group, performing oral healthcare policy tasks causes slightly higher rates of role conflict (β=.07 p<.10). Role conflict does not moderate the relationship between job content and job characteristics for the new style group. However, for the old style group, role conflict significantly moderates the relationship between oral healthcare policy and EBP tasks on the one hand, and the characteristics skill variety (β=.22, p<.01) and autonomy (β=.14, p<.01) on the

other hand. Hypothesis 7 is, therefore, rejected for the new style population but supported for the old style population.

The moderating role of GNS

Although a standard scale for GNS was used (Hackman & Oldham, 1975), the CFA showed that only three of the twelve items were useful for forming a GNS scale with our data. This resulting scale had a low internal consistency (α =.46). Therefore, the moderating role of GNS in the relationship between job characteristics and job satisfaction could not be tested satisfactorily. In addition, we performed a moderator test based on the highest single-item loading value for the given GNS construct. This test showed a negative moderating role of the GNS item on the relationship between skill variety and job satisfaction. Therefore, the positive effect of high levels of skill variety on job satisfaction is higher among dental hygienists with low GNS compared with those with high GNS, who are less satisfied in jobs with the same degree of skill variety.

The effect of self-employment on skill variety, autonomy, role conflict and job satisfaction

Self-employment is strongly related to lower skill variety (β=-.26, p<.05), greater autonomy (β=.19, p<.01) and less role conflict (β=-.35, p<.001) for the old style group. For the new style group, only autonomy is strongly affected by self-employment (β=.20, p<.10). Self-employment does not directly affect job satisfaction for either of the two groups.

5.4 Discussion

The aim of this study was to investigate the relationship between job content, experienced job characteristics and job satisfaction, and the differences between two different subsamples of dental hygienists. We found a direct relationship between actual job content and job complexity. That is, a higher level of perceived job complexity is found in clusters of dental hygienists with more extended job content. Furthermore, the majority of the effect of job content on job satisfaction is mediated by job characteristics/job complexity, and few task groups are directly related to job satisfaction.

An important finding is that role conflict in the work environment has a prominent role in our model and negatively affects both job characteristics and job satisfaction. Overall, dental hygienists with more extended job content perceive greater role conflict, which is also observed in other professions with greater responsibilities and expanded scopes of practice, such as in the adjacent domain of the higher-status profession of nurse practitioners (McMahan, Hoffman & McGee, 1994; Neale, 1999).

Our longitudinal data for new style dental hygienists showed no statistical support for expanded job content and greater job complexity and job satisfaction after three years of experience. This result is consistent with the claims of the JCM that changes in perceived job complexity and job satisfaction are to be expected only if changes in job content occur. For the individuals whose job content does change, the changes entail either the expansion or the narrowing of job content. These longitudinal data suggest that job complexity is positively correlated with some new extended tasks but is not correlated with the traditional tasks of dental hygienists.

In the following paragraphs, we present possible explanations for (1) the differences in job content and (2) the differences in job characteristics and job satisfaction between the old and new style dental hygienists. We then discuss (3) the theoretical implications of relationships between job content, job complexity and job satisfaction.

Differences in job content between old and new style dental hygienists

As expected, compared with the old style dental hygienists, the new style dental hygienists in this sample have more extended job content; the new-style dental hygienists perform more extended tasks with respect to caries decision making, caries treatment and the administration of local anesthesia. The first explanation for differences in job content between the old and new style dental hygienists is education, as the administration of local anesthesia is only introduced in the three-year dental hygiene curriculum. The old style group consists of a two- and three-year dental hygiene program; thus, the differences in the length of these programs could explain the difference in administrating of local anesthesia between the old and the new style groups. The education of new style dental hygienists in caries treatments and decision making probably increased the frequency with which the new style group performed these tasks. Only 31 % of the old style dental hygienists in our sample are educated in these treatments by means of additional courses. However, there are no statistically significant differences with respect to the performance of caries diagnosis and treatment planning tasks. One possible reason is that these competences were also part of the old curricula and have merely been extended in the new four-year curriculum. Another possible reason could be related to experience; that is, old style dental hygienists have far more experience, and these tasks are more often transferred to them because of their experience.

The second explanation for the differences in job content between the old style and new style groups may be the differences in work settings; significantly more old style dental hygienists work in dental hygiene practices compared with the new style group. Our expectations regarding the less expanded job content in dental hygiene practices is supported by the data. The differences between the job content of the dental hygienists in dental hygiene practices (primarily from the old style group) and the dental hygienists in other work settings (primarily from the new style group) may be explained as follows. (1) Dental hygienists in dental hygiene

practices are not allowed to administer local anesthesia, which could explain the higher frequency of the administration of local anesthesia among the new style group. (2) Dental hygienists who work in dental hygiene practices perform more intake appointments with (new) patients; in general dental practices, where most new style dental hygienists work, these tasks are often performed by dentists rather than by dental hygienists. (3) The dental hygienists who are the owners/managers of dental hygiene practices are also responsible for the oral healthcare policies in their practices. Because of the larger proportion of dental hygienists in dental hygiene practices in the old style group, the scores of this group with respect to policymaking activities are similar to that of the new style group. This result contrasts with our expectation based on the educational expansion of oral healthcare policy competences among new style dental hygienists.

Differences in job characteristics and job satisfaction between old and new style dental hygienists

Although the new style dental hygienists generally have more expanded job content than the old style group, the former group perceives less autonomy, lower levels of intrinsic job satisfaction and greater role conflict. There are two possible explanations for these findings.

The first explanation would be that, despite their extended job content, new style dental hygienists perceive lower levels of job complexity and job satisfaction for two main reasons. (1) Performing extended tasks in caries treatments requires dentists to assign and supervise these tasks. These requirements would indeed result in lower levels of perceived autonomy among the new-style dental hygienist group. A decrease in perceived autonomy that is associated with feeling less independent is also reported by Greene (1981). (2) The extended job content of this group causes higher rates of role conflict, which we found to be related to lower levels of job complexity and job satisfaction. Thus, although clear roles of dentists and dental hygienists may be defined at the macro level, dentists and dental hygienists are still searching for the most efficient and satisfactory division of roles between the individual professions at the meso level in numerous dental practices.

Alternatively, higher levels of perceived job complexity and job satisfaction in the old style group could be explained by different work settings. Note that our hypothesis of lower levels of job complexity for dental hygienists in dental practices is rejected; even with a restricted scope of practice, the dental hygienists in these practices perceive significantly greater job complexity. However, we could argue that the employment arrangements in terms of differences between self-employment and 'traditional' employment have a more important role than the work setting alone. As an increasing number of old style dental hygienists in dental hygiene practices own their practices, these dental hygienists operate their own businesses with all of the associated managerial activities. These dental hygienists have their own clientele and entrepreneurial responsibilities and may thus exercise

more discretion in decisions with respect to work schedules, work methods, priority setting and quality management. Ultimately, these dental hygienists have the freedom to schedule their jobs as they wish. These characteristics could explain the greater autonomy and job feedback experiences that were previously reported for self-employees (Hamilton, 2000; Fay & Benz, 2003). For the same reasons, dental hygienists in dental hygiene practices experience less role conflict. These practices contain fewer role conflicts because these practices are almost always mono-disciplinary practices with clear task division. These findings are consistent with previous conclusions regarding the relationship between autonomy, job feedback and role conflict: a lower incidence of role conflict coincides with greater autonomy and job feedback (Dubinsky & Skinner, 1984; Fried & Ferris, 1987).

Relationship between job content, job characteristics and job satisfaction: implications for theory

In the following paragraphs, we discuss the contribution of our study to the JCM theory regarding the factors that influence job satisfaction. Four different antecedents of this contribution will be discussed. In our study, the effect of (1) job content on job satisfaction is primarily mediated by job complexity. Furthermore, consistent with the literature, (2) job characteristics and (3) role conflict were identified as significant predictors of job satisfaction, whereas (4) work setting and self-employment were not identified as independent significant predictors.

We conclude that job content is a significant (but not strong) predictor of job satisfaction. Our model revealed several weak, direct links between some task groups and job satisfaction, but this relationship is primarily mediated by job characteristics. Expanded job content is related to greater job satisfaction; however, other stronger predictors diminish this positive effect of extended job content.

The relationship between job characteristics/job complexity and job satisfaction is the most studied relationship in previous research on the JCM. A meta-analysis shows a strong positive association between these two variables (r=.56) (Fried & Ferris, 1987), which is also found in our study. As a single job characteristic, skill variety explains most of the variation in job satisfaction, and this characteristic is also related to extrinsic job satisfaction and career satisfaction in our study. Therefore, we consider skill variety to be one of the most important characteristics that predict job satisfaction for dental hygienists. Other studies of dental hygienists confirm the great importance of skill variety for the job satisfaction of this group (Calley et al., 1996; Ylipää et al., 1996; Turner, Ross & Ibbetson, 2011b). A high degree of skill variety is found among dental hygienists in clusters with expanded job content, and skill variety is positively correlated with performing extended tasks. Therefore, we conclude that expanded job content, with respect to adding new tasks to the existing job content, increases job complexity in terms of skill variety and, therefore, also increases job satisfaction.

As mentioned previously, dental hygienists with restricted job content experience lower levels of skill variety but higher levels of autonomy. This negative relationship between autonomy and skill variety in our study contrasts with previous findings, which reported a positive correlation between autonomy and skill variety; jobs with high autonomy generally have greater variety (Taber & Taylor, 1990). This difference could be explained as a difference between job expansion in terms of adding new tasks (increasing skill variety) versus job enrichment in terms of adding new responsibilities (increasing autonomy). One study in UK showed no increased autonomy in dental hygienists with wider range of activities (Turner, Ross & Ibbetson, 2011a). Therefore, we question whether expanding job content by trespassing on the domain of a more dominant profession increases task variety at the expense of task autonomy. In addition, a negative relationship between two job characteristics emphasize the importance of testing the relationship between each single job characteristic and job satisfaction rather than focusing on the effect of overall job complexity on job satisfaction. By adopting the latter approach, we can identify the specific job characteristics that will increase job satisfaction.

Role conflict is directly and negatively related to job satisfaction, and this relationship is supported by a meta-analysis that was conducted by Jackson and Schuler (1985) and a review by Sullivan and Bhagat (1992). Moreover, role conflict negatively affects many other outcomes, such as job performance (Gilboa, Shirom, Fried & Cooper, 2008), commitment and job involvement, and positively affects turnover and turnover intentions (Sullivan & Bhagat, 1992).

Role conflict between dentists and dental hygienists may be caused by the close proximity of their working environments in their debates over jurisdiction and the overlapping tasks in the professional domains of both professions. Concerning the ongoing task redistribution, the high levels of role conflict are partly caused by the unstructured implementation of such task redistribution and the unavailability of protocols with regard to the manner in which tasks should optimally be divided. Each dental practice must find its own optimal role division between the two professions. Therefore, variety in the work structure and job content of dental hygienists is found. Moreover, dental hygienists who are educated in expanded scope of practice take over existing jobs of the old style dental hygienists which often include prevention and periodontology services only. Consequently, the job content does not match the competencies of the new style dental hygienists, and this mismatch increases the opportunities for more role conflicts between dentists (employers) and dental hygienists (employees). In situations in which an employer is not familiar with the new scope of practice of these dental hygienists, a significant amount of negotiation and change in role division is necessary to ensure desirable task division for all parties involved.

In this study, we tested the direct relationship between role conflict and job characteristics and job satisfaction as well as the moderating role of role conflict in

the relationship between job content and job characteristics. The literature is not consistent with respect to the location of role conflict and role ambiguity within a work structure model. In the meta-analysis of Humphrey et al. (2007), role conflict and role ambiguity are considered to be work outcome variables. Abdel-Halim (1981) provided evidence of the moderating role of role ambiguity in the relationship between job complexity and job satisfaction, whereas Sullivan and Baghat (1992) reported a moderating role of job characteristics in the relationships among role conflict, role ambiguity and job satisfaction. Role conflict and role ambiguity have been treated as job characteristics by Welsch and La Van (1981). In this study, we follow Kim et al. (2009) in labeling these variables as work environment variables. Kim et al. (2009) posited that role conflict and role ambiguity influence job characteristics; the latter is a mediator of the influence of the former on job satisfaction. In our study, the relationship between role conflict and job satisfaction is not mediated by job characteristics; rather, role conflict directly affects job satisfaction.

In summary, related to the role conflict, we found a direct effect of this work environment variable on perceived skill variety, autonomy and job satisfaction and a moderating effect on the relationship between job content and job characteristics. Moreover, one study (Tosi, 1971) showed a moderating effect of role conflict in the relationship between job characteristic autonomy and job satisfaction; the results suggested that perceived autonomy is associated with greater job satisfaction under conditions of low rather than high rates of role conflict. In our setting, the effect of perceived autonomy on job satisfaction (in terms of the decision-making opportunities that an individual has in a job) could also be weaker in conditions of greater role conflict.

Overall, we conclude that role conflict can affect the relationship between job content and perceived job complexity in inter-professional settings, especially in conditions in which tasks overlap between professions. We argue that the respondents experience less job complexity because of role conflict. Therefore, we suggest the integration of role conflict into the JCM as a work environment variable. Especially in the inter-professional context, we recommend that further research should focus on the fuction of role conflict as a possible moderator of the relationships between job content and job characteristics and between job characteristics and job satisfaction.

We found that self-employment and work settings are not direct, significant predictors of intrinsic job satisfaction. However, all of the data suggest that these variables are crucial in explaining the differences in perceived job characteristics and job satisfaction among our groups. Working in a dental hygiene practice and being self-employed generate additional value in these jobs that are distinctive from the jobs of employees in other practices. Moreover, job content in dental hygiene practices is generally less extensive because of lower skill variety, compared with individuals in other work settings. Although the work settings and

self-employment did not have a direct relationship with job satisfaction, we conclude that these variables have a significant, indirect effect on job satisfaction based on the strong relationship between role conflict and perceived job characteristics.

Moreover, self-employment is significantly related to extrinsic and career satisfaction. Although other research (Hamilton, 2000) found that self-employment was related to lower income, the statistics indicate that self-employed Dutch dental hygienists generally earn more money than those who work for others. As reported in several other studies, the greater career satisfaction among dental hygienists in dental hygiene practices can be attributed to operating their own businesses (Hamilton, 2000; Fay & Benz, 2003).

Finally, the role of GNS as a moderator in the relationship between job complexity and job satisfaction is only partly confirmed in our study because of methodological issues. GNS moderates the relationship between skill variety and job satisfaction in that dental hygienists with low GNS are more satisfied with their jobs under the same degree of skill variety than are dental hygienists with high GNS. Many researchers have reported inconsistent findings regarding the moderating role of GNS in the relationship between job characteristics and several personal and work outcomes (Fried & Ferris 1987; Boonzaier et al., 2001; Tiegs et al, 1992). Our test of the moderating role of GNS is performed only on new style dental hygienists using only one of the twelve items from the original scale. The limited experience of new style dental hygienists could affect the measured and perceived GNS and, therefore, the reliability of this scale in our sample. For example, recently graduated dental hygienists are only beginning to explore the market and become familiar with the changes and possibilities that are associated with the profession. These hygienists may need a significantly longer period to determine their preferences. As proposed in previous research, incremental changes in GNS may be observable only over a relatively long interval (Kulik et al., 1987).

Strengths and weaknesses

We succeeded in including a large sample of highly educated, satisfied professionals from more than one organization, and we measured within-subject changes. A strength of our study is that this research was conducted among all Dutch dental hygienists from different work settings. When the implications of work design theories are tested in narrow samples within one department or company, the conclusions may not be widely generalized. Another strength of this study is that we investigated the *natural* process of changing job content and perceived job complexity. Although this process was initiated by governmental changes in education and legislation, we may consider these changes as a natural process of work redesign due to the lack of structural implementation of the change in the scope of practice of dental hygienists. Because dentists were not prepared for the new style dental hygienists with their new scopes of practice and because task

delegation was an ongoing process for years due to the dentist capacity problems in the Netherlands, great variety in the job content of dental hygienists can be and has been found in different practices (with the exception of dental hygiene practices). Because of the study of the natural process of work redesign, the possible problems related to positive or negative Hawthorne effects (which occurred in many of the previously mentioned experimental studies) were lesser issues in this study.

Our study also has some weaknesses. First, we were unable to match the data from the respondents for the first and second measurements in the old style group. Therefore, we were unable to test the changes in job content and associated perceptions of job complexity and job satisfaction in this group over time. Second, there are significant differences in the age and the amount of experience of the old and new style dental hygienists, although neither variable was a statistical predictor of perceived job complexity or job satisfaction. Third, the study follow-up period of two years may be too short for our longitudinal study. Cohort studies with longer follow-up periods may show greater changes in job content resulting from experience that is gained over time. Fourth, we had a small sample size in our longitudinal study, although our response rate was satisfactory (67% at T1 and 52% at T2). At the beginning of our study, the population consisted of only 101 newly graduated dental hygienists. Therefore, the job content changes in our data were not of a sufficient magnitude to confirm our expectations in a statistical manner.

With respect to our questionnaire, to measure job content, we included items that were designed to measure the involvement of dental hygienists in decision-making processes. The literature reports that some subordinates are not in a position to adequately evaluate the level of their involvement in decision-making processes (Scandura, Graen & Novak, 1986); this lack of adequate evaluation could affect the accuracy of the measurements of the decision-making tasks of dental hygienists, especially the measurements of extended tasks. *Employees who feel positive about their work and work environments overestimate their roles in decision making,* state Schriesheim and colleagues (Schriesheim, Neider & Scandura, 1998). In such measurements, perceptual measures of the task division of the perspectives of both the supervisors and the subordinates are needed to avoid common-source biases.

5.5 Conclusion

Dental hygienists who are educated in a new style curriculum have an expanded job content that increases job complexity and job satisfaction, as expected based on the JCM. However, two other factors (i.e., role conflict and self-employment) influence job satisfaction in the opposite direction and do not result in higher levels of job satisfaction among new style dental hygienists and/or those with more expanded job content. An expanded scope of practice causes increased role conflict. The self-employed dental hygienists experience greater job complexity and less role conflict because of their less extended job content, but more managerial responsibilities.

Chapter 6
Discussion and conclusions

6.1 Contribution to theory and areas for further research

Our study had two main aims. One goal of our study was to identify societal, organizational and individual factors and processes that contribute to dental hygienists adopting broader scopes of practice. We discovered that societal factors, such as education and legislation, provide only the conditions that are required for changes in work structuring, but the actual occurrence and outcomes of work restructuring involve a different type of inter-professional task (re)division and predominantly depend on organizational and individual factors. Our study contributes to the understanding of the influence of the inter-professional relationships between two occupations with varying amounts of power on perceived job complexity and job satisfaction in small organizations.

Our results highlight the importance of individual and interpersonal factors for work structuring and perceived job satisfaction in these small organizations. To theoretically explain the influence of individual, interpersonal and organizational factors on the (re)division of tasks between two professions within an organization, we combined the literature on Abbott's system of professions with that on Hackman and Oldham's Job Characteristics Model, and when necessary, we use complementing theories to better interpret the findings.

The second aim of our study was to explain the relationship between changed job content and perceived job characteristics, role conflict and job satisfaction. Based on the survey data, we conclude that an expansion of the job content of dental hygienists positively affects perceptions of job complexity and job satisfaction, but this positive effect can be outweighed by two other factors: inter-professional relationships in terms of high rates of role conflict and role ambiguity as well as the work setting/employment arrangements in mono-disciplinary practice or self-employment settings. These survey findings are supported by our case study findings that emphasize the importance of the interpersonal/ inter-professional and organizational factors in work (re)structuring. Because of the overlap in interpersonal/inter-professional and organizational factors that determine task (re)division and allocation and job satisfaction, we discuss the combined effect of these factors on both task (re)division and job satisfaction. This discussion will conclude with the most important theoretical contributions, detecting connections

between different theories, and recommendations to integrate theories to improve the conceptual framework of work (re)design. In the second part of this chapter, we highlight the important strengths and limitations of our research and present the practical implications of our findings. Our suggestions for further research are presented in the section containing theoretical explanations and implications.

We discovered that the expansion of the job content of dental hygienists is not necessarily positively related to overall job complexity and job satisfaction; a result which is not consistent with governmental and theoretical expectations. Although skill variety was clearly greater among clusters dental hygienists with expanded job content, the average perceptions of autonomy in the same clusters were significantly lower than that of dental hygienists with a more restricted scope of practice. As mentioned in Chapter 5, these findings contrast with previous research that has reported a positive relationship between skill variety and autonomy (Taber & Taylor, 1990). An increase in the number of tasks only leads to job enlargement, whereas job enrichment requires extending one's degree of responsibility and decision-making corresponding with the extended tasks. Therefore, within an inter-professional setting, an increase of perceived job complexity cannot be obtained by the more expansion of job content because, for less powerful professionals, more tasks may actually be associated with lower perceptions of autonomy, which is also found in our case study. The varying relation between job content and job satisfaction between the two subsamples with different educational backgrounds in our study can be explained by work environment variables: mono-disciplinary work settings, self-employment, and inter-professional relations between dentists and dental hygienists in terms of role conflict.

Dental hygienists in mono-disciplinary practices have narrower scopes of practice and, therefore, lower skill variety, but these professionals experience greater autonomy. Their job content consists of activities that allow them a maximum amount of decision making and responsibility on the job. Most of the dental hygienists in mono-disciplinary practices are self-employed and thus have an additional amount of responsibility and autonomy. Mono- or multi-professional setting and self-employment are not directly related to job satisfaction but indirectly through role conflict. This relationship leads to a discussion about the effect of inter-professional relationships on the dental hygienists' perceptions of job complexity and job satisfaction.

We discovered a relationship between role conflict and the perceptions of dental hygienists regarding job complexity and job satisfaction in both the survey and the case study data analyses. We argue that high rates of role conflict among dental hygienists with extended job content prevents them from experiencing higher levels of job complexity. Increased role conflict emerges as a result of struggles over jurisdiction, according to Abbott (1988), in situations in which more than one profession is targeted with similar tasks, such as the diagnosis and treatment of caries in dental professions. Similarly high rates of role conflict have been

discovered among nurse practitioners, a profession with a scope of practice that overlaps with that of physicians and that, in a number of countries, experiences conflict with respect to authority and jurisdiction (McMahan et al., 1994; Neale, 1999). A negative relationship between self-employment, which is highly related to mono-disciplinary work setting, and role conflict supports Abbott's theory of higher rates of role conflict in multi-disciplinary work settings. Therefore, role conflict is important in understanding the relationship between actual job content and perceptions of job complexity and job satisfaction in professions that involve conflicts with regard to jurisdiction in professional domains. Because role conflict is not a single element of the work environment but is a joint effect of work demands and the range of decision-making opportunities that are available to an individual (Karasek, 1979), we emphasize that role conflict must be integrated into the JCM as work environment variable, as we have done in this study. This approach will assist in better understanding the fit between job characteristics, work and interpersonal environment, and the individual characteristics of workers, especially in inter-professional settings with tasks that overlap between occupations.

With regard to the individual factors of workers, GNS is believed to influence the relationship between job complexity and job satisfaction (Loher, Noe, Moeller & Fitzgerald, 1985). In our study, we found a weak moderating effect of GNS on the relationship between skill variety and job satisfaction. However, the literature does not unanimously support the moderating role of GNS in the JCM. Some findings show that individuals with high GNS positively respond to jobs with high job complexity (Fried & Ferris, 1987). However, there is no evidence that individuals with low GNS positively respond to jobs with low levels of job complexity (Kulik et al., 1987). Our qualitative data indicate that high GNS may increase the proactive attitude of employees to resolve mismatches between job demands and the abilities of employees, as will be discussed below. In the work structuring literature, desirable outcomes for both employees and organizations are attributed to the match between organizational demands and the abilities of employees, that is, a demand-ability fit (Kulik et al. 1987). The *dynamic* demand-ability fit encourages employees to attempt to adapt their jobs in an attempt to resolve this mismatch (Parker & Collins, 2010). In case situations in which a mismatch between the demands of a job and an employee's abilities is observed, we discovered that dental hygienists with high GNS more often adapt their jobs to correspond to their abilities. Dental hygienists with high GNS and seemingly high self-efficacy take actions to expand their job content and thus increase their job complexity. Dental hygienists with low GNS and seemingly low self-efficacy less frequently take actions to solve mismatches in their jobs, and when they do exert such efforts, they rather take actions to decrease job content and job complexity. Increased job satisfaction is observed in situations in which dental hygienists actually take actions to resolve such mismatches. Such personal initiative is also a predictor of well-being (Taris &

Wielenga-Meijer, 2010). Therefore, we suggest further testing of the following proposition: GNS affects optimal demand-ability fits in the sense that employees with different levels of GNS react differently to job demands and have different perspectives regarding their abilities. According to the case studies' qualitative findings, self-efficacy seems to have a prominent role in explaining this proactive attitude of employees, but this assumption must be verified. Thus, we offer an additional proposition: self-efficacy and GNS are related, and they interact in the prediction of the proactive attitude necessary to resolve mismatches between job demands and employee abilities.

Having discussed the contribution of all of the important findings in conceptual terms, we now underline the most important theoretical conclusions and implications as follows:

1. Professionals adapt to the organizations in which they work rather than adhering to the basic professional socialization that is offered in educational programs to achieve productive cooperation with one another. Therefore, direct interpersonal relationships between professionals become significantly more important than the dynamics between professions at a macro level. Although Abbott studied professions at all three levels and claimed that changes primarily originate in the workplace and travel outward, his empirical studies are primarily situated at a macro level (Bureau & Saquet, 2009). Abbott (1993) himself recognizes the lack of theory covering multiple levels in both space and time and argues that most of the quantitative research on work is mutually irreconcilable and hence meaningless. We follow Abbott's recommendation to obtain more empirical data that incorporate specific career information (micro), network structures among careers and jobs (meso), and occupational/organizational level information (macro) regarding occupations and work structures in conflict and in processes (Abbott, 1993). A question that arises concerns the development of a profession in the event that the dynamics on an organizational level differ from the dynamics at a macro level. This issue will be covered in the section on practical implications.

2. Job complexity can be conceptualized at two different levels. At the level of professions, there exist some professions that attempt to gain greater job complexity, which is immediately translated into higher levels of authority and higher status, as identified by Abbott. On the individual level, job complexity is the main predictor of numerous positive outcomes, as shown in JCM research. Essentially, both individuals and professions strive for a certain amount of job complexity to remain satisfied and effective in their jobs and to ensure that they remain competitive or monopolistic in the domain. In conclusion, in both the JCM theory and Abbott's system of professions, a higher level of job complexity is related to positive outcomes. However, our results show a ceiling effect in the JCM. In our cases in which job complexity exceeds a worker's abilities, a higher level of job complexity does not result in greater job satisfaction. In fact, job satisfaction decreases because of the mismatch between work demands and worker abilities.

Such a curvilinear relationship between job characteristics and job complexity and affective outcomes has already been reported by Champoux (1992) and is related to the inverted U-shaped relationship of stress levels and human performance. De Jonge and Schaufeli (1998) also found that the fit of the non-linear model is superior to that of the linear model in the relationship between job complexity and individual outcomes. Therefore, in situations in which job complexity exceeds a professional's abilities, positive outcomes in terms of higher authority and higher status may be less prominent. In fact, the authority and the status of a profession could be questioned in situations in which job complexity exceeds a professional's abilities. Therefore, it is absolutely necessary that professionals are adequately educated and trained to perform highly complex jobs within their scope of practice to maintain their authority and professional status.

3. Furthermore, our research contributes to the understanding of the unit of analysis within the JCM. The JCM was developed and based on the level of a single job. However, in our cases, we discovered that the perceived job complexity and job satisfaction in one job are dependent on an employee's experiences and inter-professional relations at other jobs (parallel or over time), among other factors. Dental hygienists compare their jobs and generally strive for high levels of job complexity; thus, some job characteristics are present in one job, and other characteristics are present in parallel jobs and work activities. For example, dental hygienists combine jobs in different work settings to increase overall skill variety, even if this combination results in less autonomy in some jobs. Our qualitative data show that the degree of autonomy that dental hygienists had experienced in one job affected their perceived autonomy in other jobs and their view of the degree of autonomy that they believe is appropriate for them as professionals. For employees with two or more jobs, the perceived characteristics of these jobs appear to have a combined effect on job satisfaction. Therefore, we argue that in situations of multiple jobs, to adequately measure perceived job complexity and job satisfaction in one of these job, we must also include a worker's experiences and perceived job complexity in their other jobs; this approach implies that individuals should constitute the level of analysis in the JCM. In summary, our findings do not suggest conceptual changes in the JCM regarding this matter. Our recommendation to measure job complexity on the individual level only pertains to the unit of analysis. The measurement methods to assess the overall job complexity of one worker within the JCM should also include the worker's perceived job complexity in other jobs; only through this approach can *overall* job complexity be measured. A qualitative study on the job complexity of workers with a single job and workers with multiple jobs can assist us in understanding the relationship between perceived job complexities in parallel jobs.

4. In addition to the previous conclusion, we discovered that self-employed workers perceive job characteristics differently than traditionally employed workers due to the managerial responsibilities of the former with respect to their own businesses

and the discretion that accompanies such responsibilities. Traditionally, the JCM has been developed and applied within organizational and hierarchical contexts to operational workers. In our quantitative study, the self-employment condition also affected the internal coherence of the JDS. The literature reports that being independent increases the job satisfaction of self-employed workers and that being subject to hierarchy causes dissatisfaction with work among people who are employed in larger hierarchies (Fay & Benz, 2003). However, one British study of dental hygienists reports a negative relationship between self-employment and job satisfaction as a result of the underuse of clinical skills (Turner et al., 2011b). The JCM was developed when self-employed professionals were significantly in the minority compared with employed workers. Data from 2008 show that 9%of all working people in the Netherlands are self-employed without personnel, and 4.4% are self-employed with personnel (CBS-Statistics Netherlands, 2008). With the generally increasing numbers of self-employed workers in society today (Kösters, 2009), it may be important to complement the JCM by additionally including these types of workers. Therefore, we recommend the inclusion of self-employment as a context variable in the JCM to examine the manner in which different employment relationships affect individual and organizational outcomes, as proposed by Sullivan (1999) and Baron (2010).

5. Our next implication is the integration of the inter-professional component, as introduced in Abbott's work, into the JCM for the assessment of jobs in (semi-) professional contexts. Both our qualitative and quantitative data showed that inter-professional relationships in terms of role conflict have a major, if not pervasive, effect on perceptions of job complexity and job satisfaction. Moreover, the inter-professional relationships between the dentists and the dental hygienists in our study directly affect the job satisfaction of the dental hygienists, regardless of the task division and work organization. A recent theoretical framework suggests that the decisions of employees to expand their roles in important ways are shaped by interpersonal/interprofessional influence processes (Grant & Hofmann, 2011). The literature on job crafting suggests that role expansion is a proactive process (Wrzesniewski & Dutton, 2001; Lyons, 2008), whereas Grant and Hofmann (2011) argue that role expansion is often a reactive process whereby employees assume broader roles in direct response to requests from others. In summary, we discovered that interpersonal relationships both negatively and positively affect perceived role conflict, proactive attitudes that cause individuals to shape their own jobs, the view of the healthcare system, and the perceived job complexity and job satisfaction of these individuals. The direction of this effect appears to be dependent on each worker's assessment of the quality of interpersonal relationships and his or her GNS.

6. The variance-oriented JCM theory can be complemented by process-oriented job crafting theory regarding the role of GNS in the JCM. Previously mentioned proactive attitudes that attempt to solve mismatches in one's job may also be

interpreted in terms of job crafting, which is defined as *the physical and cognitive changes that individuals make within the task or relational boundaries of their work* (Wrzesniewski & Dutton, 2001, p.179). Job crafting may essentially change the direction of the relationship between a work environment and job characteristics (Kim et al. 2009); role conflict and role ambiguity are generally expressed as negative work environment characteristics for perceived job satisfaction, but high levels of role conflict and role ambiguity could also be interpreted as positive desires for job redesign in terms of job crafting. *Individuals with strong GNS could perceive complex jobs as opportunities; whereas those with weak GNS could perceive complex jobs as having excessively demanding constraints* (Schuler, 1980, p.197). We also expect that individuals with high GNS and high self-efficacy experience high rates of role conflict and role ambiguity as opportunities to develop their own jobs by actively changing the tasks or relationships in their work and thus crafting their jobs. However, this proposition must be verified. Champoux (1992) suggested that the curvilinear relationship between job complexity and job satisfaction could be either U-shaped or inverted U-shaped and thus suggested that both GNS and the quality of work context alter the shape of the curves. The combined use of variance- and process-based data is necessary to test our proposition. Eisenhardt and Bourgeois III (1988), Sabherwal and Robey (1995), and Daniels (2006) concluded that the combined use of both strategies can improve the understanding of processes, which is the job development of dental hygienists in our population, and can provide a stronger basis for practical recommendations.

7. Finally, further application of Hackman and Oldham's JCM on professional work is not possible without connecting this model to other theories pertaining to (semi-) professionals (Oldham & Hackman, 2010). Although the JCM is relatively old, the model is often referenced in policy-making activities, including discussions pertaining to task redistribution between the dentists, dental hygienists and prophylaxis assistants in the Netherlands; thus, this frequent application implies that shifting routine tasks to subordinate occupations would increase job satisfaction among subordinate groups. Our current understanding of the nature of work has been marked by technological changes, increased competition, increased skill variety, a shift toward knowledge-based work that is cognitively demanding and complex, and changes in employment contracts (Humphrey et al., 2007; Sullivan, 1999; De Varo, Li & Brookshire, 2007, Grant & Parker, 2009). Moreover, work has become increasingly interdependent such that workers now have new roles and relationships (Grant & Parker, 2009). With high levels of work interdependency, the need for the mutual adjustment of efforts and decision making increases; therefore, the need for intra-team communication also increases (Molleman, 2009). In view of these changes and the generally increasing number of *Generation Y* employees, the question arises as to whether this job design model is still applicable, as it is. Oldham and Hackman (2010) recognize this question and

offer their view on the future direction of research and theory on the work design paying special attention to social aspects of contemporary work, job crafting, changing contexts within which work is performed and increasing teamwork. Accordingly, the integration of job crafting theory into the JCM should be considered, as shown in the work of Clegg and Spencer (2007) and Grant and Parker (2009). Clegg and Spencer (2007) also included performance, competence, trust, knowledge and self-efficacy in their circular, dynamic interplay model in which the variables can simultaneously act as both predictors and outcomes. Competence, trust, knowledge and self-efficacy influenced the task division and job satisfaction of the dental hygienists in our cases. Grant and Parker (2009) introduced a dynamic model of work design and proactive behavior in which moderators, outcomes and mechanisms, via which work characteristics influence outcomes, are all relevant to proactive job behaviors rather than traditional job performance. Therefore, we support the initial work of Clegg and Spencer (2007) and Grant and Parker (2009) by studying a new model of the process of job design and hoping that our research contributes to the insights regarding the interplay of individual and environmental variables in affecting work outcomes within all changes in the nature of jobs. Combining the variance- and process-based data in such research would enable consideration of the role of reciprocal relationships that evolve over time (Sullivan & Bhagat, 1992).

Overall, we found that the main relationships among job content, job complexity and job satisfaction (as introduced in the JCM) were confirmed in our setting. In addition to this conclusion, we offer the following suggestions according to our findings: first, we suggest the integration of several context variables to improve the JCM model; second, we suggest changes in the measurement methods to apply this model to *Generation Y* workers and self-employed workers. These conceptual conclusions have several consequences for practice, but prior to any discussions regarding practical implications, we must highlight the important limitations of our study.

6.2 Limitations and strengths of the study

The limitations and strengths of our study are already discussed in the chapters that cover different research questions. In this chapter, we highlight the most important ones.

The significant relationships that were found are based on cross-sectional data; thus, the causal direction can be discussed. However, the presence of positive or negative relationships between different variables is consistent with the theoretical expectations. The longitudinal data for new style dental hygienists were gathered over a period of two years and included a small population; thus, this aspect of our study could be one of the reasons that only a few major changes in job content, job characteristics and job satisfaction were found. A long-term study using repeated

measures is required to investigate changes and causal relations between job content, perceived job characteristics, and job and personal outcomes (Wall & Clegg, 1981; Griffin, 1991). Therefore, we recommend such a study of the still growing population of new style dental hygienists to gain insight into their professional development over time.

The *ideal scenario* of task redistribution was not found in any of our cases. One respondent reported highly extensive job content in the survey, but her practice could not participate in our case study because of renovations. However, we succeeded in identifying many factors that affect the variation in task division that we did found in practices.

The generalizability of the findings in case studies is restricted by the limited number of investigated cases. To enhance the external validity of this study, we adopted a case selection strategy that was based on Yin's recommendations (Yin, 2003) (Section 2.2.1). Because of the diversity of the investigated cases with regard to certain characteristics, we assume that most Dutch dental practices will discover analogies between their own practices and one or several of the described cases. The selected cases are largely representative of the new style dental hygiene roles at the time of the study (the most extreme and rare variant was missing).

In our case studies, a combination of qualitative and quantitative data was obtained through a variety of methods. This approach enabled *data triangulation* and contributes to the enhanced internal validity of the study. Both variance- and process-based data were used. Because of the combination of the survey data, longitudinal findings and data from the case studies we succeeded not only to identify relevant factors affecting work structuring and job satisfaction, but also to explain the processes and mechanisms of the influence of these factors.

One aspect of our research that has not yet been mentioned is gender. Because of the extremely high percentage of female dental hygienists, we did not investigate gender differences. The literature suggests that different relationships between job characteristics and personal outcomes sometimes result from gender differences, as for example women are more affected by interpersonal relationships at work than men. Furthermore, Adams (2003) reports numerous obstacles that women in female-dominated occupations encounter when attempting to claim their professional status and the efforts of male-dominated professions to subordinate and limit their activities. Some of these aspects are briefly mentioned in Section 1.2.2. Hardy and Conway (1988) describe similar dynamics in the nursing field. The dynamics in the task redistribution between dentists and dental hygienists may be partly attributed to the difference in gender dominance between the two professions. This possibility should be considered when interpreting the results of our research.

6.3 Practical implications and recommendations

In this study, we provided insight into the reorganization of the professional structure of Dutch oral healthcare. We conclude that the development and sustainability of the desired reorganization by means of task redistribution are not obtained as a result of several limitations. In this section, we report the practical implications of our findings and the resulting recommendations on several levels and for different parties involved. However, we must first emphasize the high frequency of performing prevention and periodontology tasks in both old and new style dental hygienists because this high frequency indicates that these traditional tasks remain the core business of all Dutch dental hygienists. The new style dental hygienists do not perform the extended tasks in caries diagnosis and treatment at the expense of the preventive tasks. In other words, when these dental hygienists engage in extended tasks, they combine such tasks with traditional tasks. The shifting of tasks in diagnosis and treatment of periodontal diseases is patient-based versus task-based shifting of extended tasks in diagnosis and treatment of caries.

6.3.1 Implications at the societal level

Changes in education and legislation were apparently insufficient to produce the fundamental changes in work structuring in Dutch oral healthcare. Other studies (IOO, 2009; Van der Kwartel & Bloemendaal, 2009; Capaciteitsorgaan, 2010) support our finding that the government's goal has not yet been attained; moreover, these studies argue that in the absence of policy interventions, it could take a long time to attain the level of task redistribution that is proposed by the government.

Many more dental hygienists and fewer dentists are needed to stimulate task redistribution (Commissie Innovatie Mondzorg, 2006). Our study also indicates that the limited capacity of dental hygienists is an important limitation of the future task redistribution in this profession. Our qualitative data show that the current capacity of dental hygienists does not provide sufficient opportunities for dental hygienists to expand their job content in the direction that the government has proposed. In Scotland, England and Denmark, strategic reviews recommended increasing the numbers of dental hygienists stressing the role of dental hygienists within the dental team of the future (Tseveenjav et al., 2009). Based on the recent studies on actual task distribution in oral healthcare, in 2010, a higher intake of dentists compared with the intake of dental hygienists is advised in the future (Capaciteitsorgaan, 2010). This advice prompted some discussions regarding the desired direction of task redistribution and was even interpreted as a step backward (Burgersdijk, 2011).

In addition to increasing the capacity of dental hygienists as the first step in stimulating task redistribution, further policy development should be directed toward the stimulation of more patients to receive care from dental hygienists

(Hansen et al., 2010). In our case studies, we found that patients were not well informed about the scope of practice of dental hygienists, and patients tended to choose dentists for their treatments rather than other oral healthcare professionals because of the previous experience of these patients with dentists. Therefore, task redistribution could be positively influenced by information campaigns that are intended to increase public knowledge of the dental hygiene profession among patients.

The introduction of the experiment of *free pricing* in oral healthcare starts in 2012. It is unclear whether and how free pricing will affect task redistribution between dentists and dental hygienists. The effect of free pricing in physiotherapy on task redistribution is limited (Hansen et al., 2010); therefore, other instruments must be used to stimulate task redistribution. We argue that the introduction of free pricing will not be sufficient to stimulate task redistribution in the direction that is intended by the government; thus other interventions are necessary.

6.3.2 Implications for dentists

The implications for dentists are presented in two ways. First, there are three implications for dentists who are the owners/employers of a dental practice. Second, we present implications for dentists who work with other oral healthcare occupations.

First, dentists who own their own practices make decisions with regard to the management of care supplies and care demands for their practices. Thus, although full-time equivalent (FTE) dental hygienists in a practice can be viewed as an organizational factor that affects task distribution, our case studies indicate that decisions regarding FTE dental hygienists are made by dentist-owners. Based on actual FTE dental hygienists and increasingly periodontal care demands, we predict little or no progress in task redistribution. Our results show that to expand their job content, dental hygienists must expand their number of working hours in a single job. By creating more opportunities to perform all extended tasks, dental hygienists can expand their job content. As decisions pertaining to the expansion of FTE dental hygienists in a practice are made by dentist-owners, we recommend that dentists assess their preferences in the composition of their teams and future roles of dental hygienists in their practices when deciding on the FTE of the dental hygienist. Moreover, our case study data indicate that few task redistribution efforts are to be expected in the future because of the sufficient capacity of dentists. Dentists are not *forced* to delegate tasks. Again, we conclude that dentists-owners can influence task division in their practices by making choices with regard to FTEs for different occupations and work structuring by considering actual care demands.

Second, the dentists from our cases are not convinced of the higher efficiency levels that can result from task distribution efforts to expand the jobs of dental hygienists. We did not observe higher efficiency in terms of the number of treatments that

were performed as a result of distributing more extended tasks to the dental hygienists. However, professionals from other medical sectors report higher efficiency levels and lower costs as a result of increased task delegation/task redistribution among occupations (Van der Kwartel & Bloemendaal, 2006). Although the literature indicates that the higher levels of professional scope of practice of dental hygienists result in better oral health outcomes for individuals (Contineli, 2008), Dutch new style dental hygienists have been practicing only for a few years; thus, it is difficult to measure the effect of task redistribution in terms of efficacy and efficiency. In our study, we found that the lack of higher efficiency levels in practices with dental hygienists with expanded job content is primarily caused by the slow performance of dental hygienists in completing such extended tasks and their need for supervision. One small observational study found that dental hygienists require three times the amount of time that a dentist requires for caries treatment (Offenbeek van, Jerkovic & Weening-Verbree, 2010), but we cannot tell whether this finding is representative. Moreover, the dentists from our cases report an increasing need for supervision and consultations because of the distribution of more extended tasks to dental hygienists; these needs, in turn, affects the role of dentists as supervisors and their work schedules. Therefore, the extended tasks may, in the short term, negatively affect efficiency in terms of the number of patients who are treated. However, investments in supervision/consultations may be rewarded in the long term, as the literature reports higher job satisfaction and longer retention in practices in which hygienists can develop their skills. Moreover, Humphrey et al. (2007) concluded in their meta-analysis that the two best predictors of job satisfaction were autonomy and social support. Thus, if an organization were interested in improving job satisfaction, then it could increase either autonomy or social support. From this perspective, investments in supervision/ consultations could contribute to increasing both autonomy and social support. In relation to these issues, a longitudinal study on the effect of task redistribution on efficiency in oral healthcare is recommended to account for the increasing experience of dental hygienists and the decreasing need for supervision. Besides the supervision, the employer needs to consider some other organizational preconditions needed to be fulfilled in order to make it possible for dental hygienists to perform extended tasks: need for an extra assistant and possible changes in practice equipment.

Third, we discovered a mismatch between the abilities of dental hygienists and their work demands in several of our cases. Therefore, a general recommendation to the employers of dental hygienists would be to assess the current task division in a practice and measure the current fit between the abilities and job demands of dental hygienists. Thus, when new dental hygienists are employed in a practice, the job design should be negotiated to ensure that it corresponds with the knowledge, skills and abilities of these dental hygienists. In many of our cases, this negotiation did not occur; the new style dental hygienists simply assumed the jobs of the old

style dental hygienists. The literature reports that participating in the redesign process fosters commitment and increases employee job satisfaction (Seeborg, 1978; Griffeth, 1985). The lack of communication and the lack of opportunities to engage in the development of the job content of dental hygienists eventually lead to a decrease in the overall job satisfaction of dental hygienists. Moreover, the literature suggests that jobs that do not utilize and develop the existing skills and abilities of workers may eventually lead to a deterioration of talent (Kulik et al., 1987), which is also reported for dental hygienists-therapists in UK (Turner et al., 2011b). The authors found a strong link between the underuse of therapy skills and job satisfaction; the underuse of these skills raised the danger of deskilling, demoralization and poor staff retention. Dental hygienists with restricted scopes of practice are likely to experience burn-out and early departure from the profession, whereas increased task redistribution would lead to more satisfied and better educated dental hygienists and, consequently, more relieved dentists (Christensen, 1995). The combination of all of these factors demonstrate the importance of creating jobs for dental hygienists that correspond to both the abilities and desires of the dental hygienists and the care demands in practices. We argue that both dentists and dental hygienists should participate in creating job descriptions for dental hygienists. This collaboration would result in increased job satisfaction, practice retention, lower burn-out rates and, eventually, increased productivity.

In the following paragraphs, we discuss the implications of our study and recommendations for dentists as professionals who work closely with other occupations in oral healthcare.

Our qualitative data suggest that dentists are not willing to relinquish the power to determine which patients should be treated by which profession. Dentists do not consider dental hygienists as professionals in the first line of care that can make decisions regarding treatments outside of periodontology. Dentists argue that dental hygienists are not competent in these tasks and responsibilities. These findings are supported by studies that report similar inter-professional conflict between dentists and dental hygienists in other countries, such as the USA, Norway, Australia and Canada (Chapko et al., 1985; Abelsen & Olsen, 2008; Hopcraft et al., 2008; Adams, 2004b). In our case, the dentist's view of work structuring in oral healthcare and of the competence of dental hygienists was found to be one of the most important factors that affect task division. Recent studies in the Netherlands also support our findings that dentists remain conservative regarding task redistribution when sufficient opportunities exist to safely delegate tasks to other professionals (Gezondheidsraad, 2008; Van der Kwartel & Bloemendaal, 2009). Based on these findings, and supported by the findings in other countries, we argue that no major changes in the division of tasks between dentists and dental hygienists can be expected if no changes occur in the views of dentists regarding the competence of dental hygienists and the role of hygienists in oral healthcare. The most recent report of RVZ (2011) argues for the stimulation of

task redistribution in healthcare through the implementation of several actions: (1) clarify the responsibilities of professions, (2) provide insight into the competences of different professions and (3) overcome cultural problems between professions (by, for example, educating professions together).

In relation to these dynamics between dentists and dental hygienists, Axelsson and Axelsson (2009) introduced altruism as an alternative to territorial behavior between professionals. Such altruistic collaboration has become increasingly necessary to compensate for the increased specialization and higher professionalization of many occupations. This collaboration also underscores a more holistic approach that is required to fulfill the needs of clients or patients. Several processes are necessary to achieve this altruistic inter-professional cooperation. First, all involved parties need expanded experience to ensure that professionals will be open to recognizing and appreciating the knowledge and competences of one another. Second, a trust-building process must be implemented. Third, an altruism-based cooperation must be well supported and well managed. Considering the three actions that stimulate task redistribution as defined by RVZ (2011), we argue that such altruism-based cooperation between dentists and dental hygienists could positively affect task redistribution.

6.3.3 Implications for dental hygienists

This study shows that the task redistribution developments, by the expansion of the job content of dental hygienists, have had limited effects on their professional development thus far. Moreover, our results indicate that the job satisfaction levels of these newly graduated dental hygienists are more affected by numerous other factors than by the expansion of their job content. Our quantitative analysis revealed an interrelation between two job characteristics: autonomy and skill variety. Dental hygienists with more expanded job content perceive greater skill variety but lower autonomy, dental hygienists with less expanded scopes of practice perceive lower skill variety but greater autonomy. As both job characteristics are significant predictors of job satisfaction in our study, positive influence of skill variety and negative influence of autonomy tend to outweigh one another. In conclusion, dental hygienists do not necessarily need extended job content to experience increased job satisfaction, as numerous other factors also affect job satisfaction. In choosing a job, dental hygienists should consider the negative interrelation between skill variety and autonomy.

Second, we discovered that practice retention for dental hygienists is affected by factors related to their job content. The literature shows that skill variety in the job content of dental hygienists is one of the important reasons that these professionals remain in practices for a longer period of time (Calley et al., 1996). We predict that the expansion of the working hours within a single practice rather than a combination of two or more part-time jobs would result in the expansion of job content and an increase in skill variety within a single practice. However, it is

unclear whether dental hygienists would prefer a single (full-time) job in one practice with opportunities for job expansion and thus increased skill variety over part-time jobs in multiple practices. Based on our findings, we recommend that dental hygienists consider all the factors when determining whether to take a single job or a combination of part-time jobs. Again, a qualitative study could reveal the preferences of dental hygienists for taking a single job or taking combined jobs in an attempt to achieve job satisfaction and task complexity.

Related to the practice retention of dental hygienists, the literature suggests that *Generation Y* employees, a group to which our population of new-style dental hygienists belongs, show a more proactive attitude and take dynamic actions to shape their jobs (Kim et al., 2009), and these employees tend to leave an organization if their abilities are not utilized or if they do not receive professional development training (Martin, 2005). The overall shortage of dental hygienists in the Netherlands may also contribute to the lower retention of dental hygienists in jobs with low levels of job satisfaction or in jobs with mismatches between abilities and job demands. In a profession with abundant vacancies, dental hygienists are more likely to change jobs. Furthermore, part-time employees generally have higher turnover than full-time employees (Martin & Sinclair, 2007). Moreover, role conflict and role ambiguity, which were both present in dental hygienist jobs in our research, are detrimental to organizational commitment (Welsch & La Van, 1981), turnover and turnover intentions (Sullivan & Bhagat, 1992). Thus, the proactive attitudes of dental hygienists to shape their jobs, the ample vacancies in the profession in the Netherlands, and role stress negatively affect the retention rate of dental hygienists in dental practices. Because the dentists in our cases are well aware of these dynamics, some dentists are willing to delegate extended tasks to dental hygienists to ensure their satisfaction and to prevent dental hygienists from leaving their practices. As mentioned previously, to obtain a satisfied, productive dental hygienist with long practice retention, employers and hygienists should work together to create jobs for dental hygienists that account for the specific skills and abilities of individual hygienists.

The dental hygienists in our cases are not necessarily eager to obtain more authority and responsibility; they simply desire more expanded job content for the purpose of increased task variety. This finding is not consistent with the government's goal to increase the authority and responsibility of dental hygienists by shifting more tasks to them. One possible explanation for this finding could be the relatively low self-efficacy and limited work experience of new style dental hygienists; these attributes cause them to be insecure about their abilities and, therefore, hesitant to accept greater responsibility. One Canadian study shows that young female dental hygienists are less supportive of the professionalization of dental hygiene compared to older and more experienced female and male dental hygienists (Adams, 2004b). Another possible explanation is that the work field does not offer sufficient opportunities for these hygienists to gain the authority and

responsibility that they must have to further develop their skills. A combination of both reasons is the likely cause of the low level of task redistribution. A longitudinal study of the job content and perceived job complexity of dental hygienists and their views regarding their roles among professionals in the field of oral healthcare would lead to an understanding of the relationship between work experience, inter-professional relationships and work structure in oral healthcare and how this relationships relates to the goals and ambitions of hygienists.

6.3.4 Implications for patients

Thus far, patients have not been affected by the changes in the division of work, as most patients continue to be treated by dentists for the majority of the extended tasks, such as dental checkups and caries diagnoses and treatments. Even when these tasks are performed by a dental hygienist, the costs are identical for patients.

As mentioned previously, Dutch patients are not fully informed about the changed function and direct accessibility of the dental hygiene profession, and this lack of information interferes with further task redistribution. Few patients consider visiting a dental hygienist of their own initiative, as most patients are accustomed to visiting dentists. Creating more clarity in terms of the task authority and responsibilities of different occupations in the oral healthcare field can contribute to more successful task redistribution (Commissie Innovatie Mondzorg, 2006). Therefore, we recommend information campaigns for patients that focus on the job content, roles and responsibilities of different oral healthcare providers, particularly dental hygienists and prophylaxis assistants.

Compared with dentistry, dental hygiene is a relatively new profession that was established in the 1970s. Most of the patients in our cases had no experience with dental hygienists, and some of these patients were unaware of the difference between a dental hygienist and a prophylaxis assistant. This result is consistent with previous findings of the Consumers Union (Jacobs, van Nobelen & Broerse, 2002). In the panel research of these authors, 59% of patients find it *acceptable* that dental checkups and simple treatments are performed by dental hygienists. In our case studies, most patients prefer a dentist over a dental hygienist for dental checkups and caries treatment, but they prefer dental hygienists for particular treatments, such as instructions in oral care and calculus removal; these findings are consistent with those of the NIVEL study (Hansen et al., 2010). Again, we emphasize that individual, governmental and public awareness and acceptance of the actual and potential role of dental hygienists in healthcare is necessary to facilitate patients in directing their own oral care supply choices.

6.3.5 Implications for dental hygiene education

Professional socialization is viewed as a two-step process in which the skills and values that are acquired in training must be adjusted to the demands of specific work environments with the relative power of professionals to choose alternative

intervening variables (Lurie, 1981). We discovered that work settings and interpersonal relationships in work settings modify the views of dental hygienists regarding their roles as professionals. In the parallel case of nurse practitioners, the formal socialization that occurs during education contrasts with the socialization that occurs in work settings in the enactment of the role as a graduate professional. Nurse practitioners in the USA were unable to sufficiently change their work settings to replicate the socialization models that were presented in their training (Lurie, 1981). We also discovered that new style dental hygienists are not yet able to replicate the socialization model that is presented in their training; moreover, they tend to adapt to work setting conditions and change their views regarding their professional roles. Therefore, dental hygiene education should enhance their relationship with the work field to gain insight into the actual demands and work structure of various work settings. Only by adopting this approach can dental hygiene education anticipate and prepare dental hygienists to better negotiate the actual work structure in the work field.

Dental hygienists are educated for jobs in various work settings and for jobs that require specific expertise. Although the great majority of dental hygienists work in general dental practices, the knowledge and skills that are necessary to perform jobs in hospitals, elderly care, orthodontics, and other settings are integrated into their curriculum. The current curriculum includes a large component of caries diagnosis and treatment knowledge and skills. Thus, the following question arises: how cost-effective is the new dental hygiene curriculum? Based on the results of this study, we conclude that the knowledge and skills of the first three cohorts of new style dental hygienists are not optimally utilized. This result may partly be due to the low self-efficacy in the extended tasks of the only recently graduated dental hygienists in our study. According to dental hygiene schools, this problem has already been solved, as they have improved the curricula and training regarding extended tasks in recent cohorts.

Since the introduction of the new four-year curriculum, dental hygiene schools are struggling even more with the mixed composition of student groups and low graduation rates. The wide range of initial competences and abilities of students is important because, according to their abilities, some students better suit for occupations with low autonomy and responsibilities, whereas other students are perfectly capable of acting as professionals. Only recently has the government changed its policy regarding the selection of students and now allows schools to individually select candidates rather than selecting candidates by random drawing. This selection of students based on the critical knowledge, skills and attitude that are required to perform the job as a professional can decrease dropout rates, increase success rates, and form a capable student population who will develop into competent and confident professionals.

Regarding the significance of interprofessional relations between dentists and dental hygienists for the success of task redistribution, we recommend better

introduction of dental hygiene profession and the introduction of different possibilities for cooperation with dental hygienists in dentists' education.

6.3.6 Implications for the professionalization of dental hygiene

Professionalization is a complex, social and dynamic process with several levels of action, and professions move in several directions rather than a single direction as implied by the term or even in two directions as implied by the pairing of professionalization and de-professionalization (Abbott, 1991). In this study, we observed individual movements toward the professionalization and de-professionalization of dental hygiene in terms of dental hygienists crafting their jobs to gain more authority or to avoid authority.

As Lautar (1995 a) proposes, the first step for dental hygiene to attain a professional status is to ensure that the dental hygienists themselves actually desire this status. This is in line with Nelson and Barley (1997) who introduce two requirements for cultural mandate; self-confident precursors and the professional community's acknowledgement of the tasks that shall be performed by the occupation. Our case studies revealed that new style dental hygienists hold varying views regarding professionalization. Most hygienists are convinced that they should not act as primary care providers as proposed by the committee on Innovation in Oral Healthcare. Another Dutch study found that dental hygienists are divided in their preferences regarding job content and responsibility. Some dental hygienists seek opportunities to expand their job content and responsibility, whereas other hygienists do not seek such opportunities (Van der Kwartel & Bloemendaal, 2009). Similar findings have been reported for Canadian dental hygienists regarding their scope of practice and professional status (Brownstone, 1999; Adams, 2004a). Because of, among others, differences in the educational levels of Dutch dental hygienists (two-, three- or four-year curricula), the field of dental hygiene is sometimes struggling with different views regarding the professionalization within the profession itself. Professional community acknowledges dental hygiene profession; there is institutional license on a macro level, however, on the level of organizations many different scenarios are occurring. Kathan (2007) introduces the 'organizations' mandate', as the final determinant of which tasks are to be performed by which occupation. In Kathan's study the organizations are large hospitals, whereas we refer to small dentists practice mostly owned by one dentist. In conclusion, the choices and preferences of individual dentists as employers of dental hygienists may, directly and/or indirectly, affect the development of dental hygiene as a profession.

Dental hygienists in Canada reported that an increase in education would elevate the professional status of dental hygienists in the view of dentists, who, as the study indicates, do not consider hygienists to be professionals (Lautar 1995 b). Our study shows that an expanded dental hygiene education slightly improves the professional status of Dutch dental hygienists.

Recently, the majority of dental hygienists, members of Dutch Association of Dental Hygienists, approved the association's future plans to promote the profession and the professionalization of dental hygiene; 2012 is pronounced to be the year of *empowerment* of dental hygienists by the Dutch Association of Dental Hygienists. Greater responsibility, increased levels of accountability and possibly more full-time jobs could be notable consequences of the professionalization of dental hygiene in the Netherlands.

6.3.7 Practical implications – conclusion

In conclusion, according to our findings, we assert that the reasoning of policy makers, which indicates that certain tasks are to be delegated/redistributed to other occupations, has only marginally been implemented. A significant amount of this implementation depends on how the work is structured within practices by practice owners and within their institutionalized traditions, ideas and new visions. In following this new vision, dental practice owners encounter practical constraints, such as the need to align client demand and supply resources. Rather than engaging in discussions regarding task distribution at the societal level between professions, one should begin to consider the ultimate goal of offering patients the best possible care for the best price. In view of this goal, in each practice (whether dentist- or dental hygienist-owned practices), tasks can be divided in such a way to ensure that the optimal autonomy, skill variety and job satisfaction for all parties involved can be obtained with the optimal use of the knowledge and skills of these professionals. In situations of competing demands between professionals, some tradeoffs can be made. The JCM offers a starting point for further research because this model, in addition to job satisfaction, also includes efficacy and efficiency as outcome variables. In this respect, the following scenarios for an expanded scope of practice appear to be worthy of consideration:

Scenario A

> In this scenario, each practice contains one or more dyads of dentists and dental hygienists working closely together. Initial patient visits are conducted cooperatively by a dentist and a dental hygienist, and they collaborate to determine treatment plans. These professionals make decisions regarding task division given that, in principle, dental hygienists perform all of the treatments within his/her scope of practice. Dental checkups are performed by dentists and dental hygienists by turns—two dental checkups per year: one checkup that is performed by a dentist and another checkup that is performed by a dental hygienist.

Scenario A was considered to be the ideal type of cooperation by some of the dental hygienists in our cases. The shared responsibility is the characteristic feature of this cooperation, as increased responsibility/authority appears to be the crucial obstacle that dental hygienists encounter in their attempts to perform within e ideal

scenario of Committee Innovation in Oral Healthcare. Based on our findings, we could expect high levels of job satisfaction among dental hygienists in this scenario because of their expanded scopes of practice, cooperation with dentists, and a reasonable amount of autonomy and responsibility.

Scenario B

Each practice contains three dental hygienists and one dentist working on three treatment chairs simultaneously. The dentist diagnoses diseases and determines a treatment plan with input from a dental hygienist with regard to a patient's periodontal status and oral hygiene. Dental hygienists perform the treatments within their extended scopes of practice. Extensive periodontal treatments are performed outside the switch system.

Scenario B was mentioned by two dentists from our case study who imply that this type of cooperation would be the most efficient and effective way of optimally using the competences of dental hygienists. In this scenario, dental hygienists are only responsible for the treatments that they perform, as diagnosis and treatment plans are determined by dentists. We could expect lower levels of job satisfaction among dental hygienists in this scenario (especially among those with high GNS and self-efficacy) compared with dental hygienists in scenario A. This result would occur because of fewer responsibilities and decision-making opportunities for dental hygienists.

Scenario C

Each practice contains one dentist and three dental hygienists. Dental hygienists perform intakes with new patients and dental checkups for all patients. For patients with stable dental and general health (including children), a dental hygienist determines their treatment plans and is responsible for all treatments and care provided. In all other cases, the dentist and the dental hygienist decide together on the treatment plans and both participate in such treatments. A dental hygienist performs all of the extended tasks, and the dentist performs all of the tasks that are beyond this dental hygienist's scope of practice. Dental hygienists can refer patients to prophylaxis assistants for oral hygiene instruction, education and calculus removal. Thus, this scenario maximizes the patient-centered allocation of professionals: the dental hygienists refer patients to the dentist when necessary, and the dentist involves the dental hygienists whenever possible.

Scenario C is close to the ideal scenario of the Committee Innovation in Oral Healthcare, but interestingly, most of the participants from our case study, including both dentists and dental hygienists, questioned the feasibility of this scenario. The responsibility of dental hygienists in this scenario is larger than that which was observed in our cases and surveys. We expect that only dental hygienists with high self-efficacy and GNS who are fully capable of performing within this

scenario would experience high levels of job satisfaction. Because the government plans are aimed at this type of cooperation, we recommend experimenting to determine the extent to which this scenario is feasible for providing the most effective and efficient dental care in the Netherlands and resulting in the most satisfied and productive workers.

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Appendices

Appendix I: Questionnaire used in new style 1 measurement (the lay-out differs from the original questionnaire)

1. Wat is uw geslacht?

man *vrouw*

2. Wat is uw geboortedatum?
3. In welke plaats hebt u de opleiding Mondzorgkunde gevolgd?

Amsterdam *Nijmegen*
Groningen *Utrecht*

4. Afstudeerrichting/minor/specialisatie

vrije vestiging
orthodontie
parodontologie
ziekenhuis
jeugdzorg
geriatrie
anders, namelijk

5. Behaalde diploma's voorafgaand aan uw opleiding Mondzorgkunde *(meerdere antwoorden mogelijk)*

HAVO *MBO-tandarts assistente*
VWO *andere MBO-opleiding*
HBO *andere opleiding*

6. Wat is de beste omschrijving van uw huidige situatie?

werk *werk en studie*
studie *anders*

7. Bent u op dit moment werkzaam als mondhygiënist?

ja *nee*

8. In welke soort praktijk / organisatie bent u werkzaam als mondhygiënist?

algemene tandheelkundige praktijk
groepspraktijk
zelfstandig gevestigde praktijk mondhygiëne
orthodontie praktijk
parodontologie praktijk
ziekenhuis
GGD
onderwijs
anders, namelijk

9. Hoeveel uur per week bent u in totaal als mondhygiënist werkzaam? (volgens de aanstelling)

10. In welke soort praktijk / organisatie bent u <u>het grootste deel</u> van uw werkweek werkzaam? *(één antwoord mogelijk)*
Toelichting: *Vragen 11 t/m 17 hebben betrekking op deze praktijk / organisatie. Bij aanstellingen van gelijke grootte vult u naar uw keuze een van de praktijken*

in, bij voorkeur een praktijk waarin u bezig bent met de directe patiëntenzorg.

algemene tandheelkundige praktijk
groepspraktijk
zelfstandig gevestigde praktijk mondhygiëne
orthodontie praktijk
parodontologie praktijk
ziekenhuis
GGD
onderwijs
anders, namelijk

11. In welke provincie bevindt zich deze praktijk / organisatie?

drenthe
flevoland
friesland
gelderland
groningen
limburg
noord-brabant
noord-holland
overijssel
utrecht
zeeland
zuid-holland

Onderstaande vragen 12 t/m 17 hebben betrekking op de praktijk / organisatie uit de vorige vraag.

12. Begindatum huidige baan

Maand:
Jaar:

13. Soort dienstverband

loondienst
uitzend-, oproepkracht
zelfstandige
omzetbasis
maatschap
anders, namelijk

14. Hoeveel uur per week bent u in deze praktijk / organisatie als mondhygiënist werkzaam? (volgens de aanstelling)

15. Hoeveel medewerkers van welke disciplines zijn werkzaam in deze praktijk / organisatie?

Discipline	**Aantal**
tandarts	
implantoloog	
parodontoloog	
orthodontist	
mondhygiënist (uzelf meegeteld)	
preventie assistente	
tandartsassistente	
secretaresse	
anders, namelijk	

16. Hoeveel behandelstoelen heeft deze praktijk / organisatie? *(Als deze vraag niet van toepassing is vult u 0 in)*
Aantal behandelstoelen

17. Grootte van het patiëntenbestand in deze praktijk / organisatie *(ongeveer) (Als deze vraag niet van toepassing is vult u 0 in)*

Deel 2: Vragen met betrekking tot uw takenpakket

Indien u zich niet met de patiëntenzorg bezig houdt kunt u de vragen 18 t/m 21 overslaan. Ga dan alstublieft naar vraag 22.

18. Onderstaande vragen hebben betrekking op de frequentie waarmee u bepaalde activiteiten uitvoert in uw werk. Er zijn zes antwoordmogelijkheden op elke stelling:

- Nooit
- Zelden
- Soms
- Meestal
- Altijd
- N.v.t.
Voorbeeld: "Altijd" betekent dat u dit bij elke patient uitvoert, waarbij de gegeven activiteit plaats moet vinden en dus nooit uitbesteed of overlaat aan een ander. Wanneer de activiteit nooit voorkomt in deze praktijk kiest u voor de optie "N.v.t."

Kunt u van de volgende activiteiten aangeven hoe vaak u deze uitvoert?
Gegevens verzamelen en analyseren

Intake onderzoek bij nieuwe patiënten
Medische en tandheelkundige anamnese afnemen
Periodiek mondonderzoek bij de patiënten
Cariësdiagnostiek tijdens het mondonderzoek
Röntgenfoto's maken
Pocket/parodontiumstatus maken
Diagnose stellen m.b.t. de parodontale aandoeningen
Diagnose stellen m.b.t. de cariës
Diagnose stellen voor andere tandheelkundige aandoeningen
Zelfstandig behandelplan maken voor patiënten met parodontale aandoeningen
Zelfstandig behandelplan maken voor patiënten met cariës
Participeren in het maken van een behandelplan voor gecompliceerde patiënt
Wetenschappelijke literatuur gebruiken in mijn beslissingen t.a.v. de diagnose en behandelplan.
Wetenschappelijke literatuur raadplegen bij gecompliceerde gevallen/aandoeningen
Gegevens verzamelen t.b.v. het wetenschappelijk onderzoek

Behandelen - uitvoerende taken

Uitvoeren van Initiële behandeling bij patiënten met parodontale problematiek
Herbeoordeling van de parodontale behandeling
In teamverband uitvoeren van parodontale chirurgie
Voorlichting geven
Mondhygiëne instructie geven
Begeleiden en controle van patiënten met orthodontische apparatuur
Supragingivaal tandsteen verwijderen
Subgingivaal tandsteen verwijderen
Sealant leggen zonder uitslijpen van fissuur
Sealant leggen met uitslijpen van fissuur
Aanbrengen van orthodontische apparatuur
Verwijderen van orthodontische apparatuur

Infiltratie anesthesie toedienen
Geleidingsanesthesie toedienen
Polijsten en corrigeren van composiet restauraties
Polijsten en corrigeren van amalgaam restauraties
Eenvoudige extracties van melkelementen
Eenvoudige extracties van blijvende elementen
Bleken van gebitselementen
Vastzetten kroon
Nazorg bij implantaten
Hechtingen verwijderen
Kleine pijnklachten behandelen
Prothese beslijpen

19. Voert u in de praktijk preparaties en restauraties van cariës met behulp van plastische vulmaterialen uit?

Ja *Nee*

20. Kunt u van de volgende curatieve handelingen aangeven hoe vaak u deze uitvoert?
Voorbeeld: "Altijd" betekent dat u dit bij elke patient uitvoert, waarbij de gegeven activiteit plaats moet vinden en dus nooit uitbesteed of overlaat aan een ander.

Eenvlakspreparatie in melkelementen
Eenvlaksrestauratie in melkelementen
Eenvlakspreparatie in blijvende elementen
Eenvlaksrestauratie in blijvende elementen
Meervlakspreparatie in melkelementen
Meervlaksrestauratie in melkelementen
Meervlakspreparatie in blijvende elementen
Meervlaksrestauratie in blijvende elementen
Secundair cariës behandelen

21. Kunt u aangeven hoe vaak u zelfstandig beslist om de volgende activiteiten uit te voeren.
Voorbeeld: "Altijd" betekent dat u dit bij elke patient uitvoert, waarbij de gegeven activiteit plaats moet vinden en dus nooit uitbesteed of overlaat aan een ander. Wanneer de activiteit nooit voorkomt in deze praktijk kiest u voor de optie N.v.t.

Ik beslis zelfstandig om.....
een röntgenfoto te maken t.b.v. cariës diagnostiek
een röntgenfoto te maken t.b.v. diagnostiek van parodontale aandoeningen
een röntgenfoto te maken t.b.v.orthodontie
een röntgenfoto te maken t.b.v. nazorg implantaten
gebitsafdrukken te maken
een pocket/parodontiumstatus te maken
ander aanvullende diagnostiek te gebruiken (speeksel-, bacteriologisch test)
fissuren te sealen bij kinderen
fissuren te sealen bij volwassen
infiltratie anesthesie toe te dienen
geleidingsanesthesie toe te dienen
eenvoudige extractie van melkelementen uit te voeren
eenvoudige extractie van blijvende elementen uit te voeren
een eenvlaksrestauratie in melkgebit te leggen

een eenvlaksrestauratie in blijvend gebit te leggen
een meervlaksrestauratie in melkgebit te leggen
een meervlaksrestauratie in blijvend gebit te leggen
secundair cariës te behandelen

22. Kunt u van de volgende indirecte activiteiten aangeven hoe vaak u deze uitvoert?
Voorbeeld: "Altijd" betekent dat u dit bij elke patient uitvoert, waarbij de gegeven activiteit plaats moet vinden en dus nooit uitbesteed of overlaat aan een ander. Wanneer de activiteit nooit voorkomt in deze praktijk kiest u voor de optie N.v.t.

Opzetten van een wetenschappelijk onderzoek
Analyseren van een wetenschappelijk onderzoek
Rapporteren van een wetenschappelijk onderzoek
Deelnemen aan het bepalen van het tandheelkundige beleid in uw praktijk/organisatie
Deelnemen aan het bepalen van het beleid t.a.v. de zorg voor kinderen
Zelfstandig een preventieplan maken voor specifieke zorggroepen
Deelnemen aan het ontwikkelen van nieuwe protocollen/richtlijnen in uw praktijk/organisatie

Indien u zich niet met de patiëntenzorg bezig houdt kunt u de vragen 23 en 24 overslaan. Ga alstublieft naar vraag 25.

23. Houdt een tandarts toezicht terwijl u .....

Antwoordmogelijkheden:

1. nee, er wordt nooit toezicht gehouden
2. nee, er wordt uitsluitend achteraf gecontroleerd
3. houdt incidenteel toezicht
4. houdt regelmatig toezicht
5. houdt meestal toezicht
6. houdt altijd toezicht
7. n.v.t.

	1	*2*	*3*	*4*	*5*	*6*	*7*
een fissuur uitslijpt?							
anesthesie toedient?							
een caviteit prepareert?							
preparatie restaureert?							
een element extraheert?							
secundair cariës behandelt?							

24. In hoeverre ervaart u belemmeringen bij het gebruikmaken van de uitbreiding van uw deskundigheidsgebied ten aanzien van het prepareren en restaureren van primaire cariës? (meerdere antwoorden mogelijk)

geen belemmeringen
deze vraag is niet van toepassing voor mijn werksituatie
gebrek aan (stoel)assistentie
gewenste/benodigde materialen zijn niet in de praktijk aanwezig
u voelt zichzelf niet competent genoeg
u krijgt geen opdracht voor deze handeling
u wordt niet competent geacht door de opdrachtgever
u krijgt geen begeleiding van de opdrachtgever

patiënten willen hiervoor(liever) niet door mij behandeld worden
er wordt onvoldoende tijd ingepland voor deze verrichtingen
mijn programma is te vol met andere afspraken
anders, namelijk

Deel 3: Vragen met betrekking tot de kenmerken van uw takenpakket en uw werksituatie

25. Onderstaande stellingen hebben betrekking op uw takenpakket.
Er zijn vijf antwoordmogelijkheden op elke stelling:

1. Volledig oneens
2. Grotendeels oneens
3. Noch oneens, noch eens
4. Grotendeels eens
5. Volledig eens

Taakkenmerken

Ik kan al mijn vaardigheden gebruiken in mijn werk	
Ik kan in mijn werk al mijn mogelijkheden gebruiken.	
Mijn werk is gevarieerd.	
Ik heb afwisselend werk.	
De werkzaamheden die ik verricht, verschillen van elkaar.	
In mijn baan kan ik de taken (waaraan ik begin) helemaal afronden.	
Het resultaat van mijn inspanning bij het werk is zichtbaar in de producten (of diensten) die geleverd worden.	
Mijn werk bestaat uit het maken van een geheel product (of het leveren van een aparte dienst).	
Ik kan mijn werk van begin tot eind helemaal zelf uitvoeren.	
In het geheel van mijn activiteiten van deze praktijk is mijn bijdrage te herkennen.	
Het werk dat ik doe is van belang voor deze praktijk.	
Het werk dat ik doe is van belang voor het functioneren van mijn collega's.	
Het werk dat ik doe is van belang voor de samenleving.	
Het werk dat ik doe is van belang voor de patiënten van deze praktijk.	
Ik heb de gelegenheid om zelf te beslissen hoe ik mijn werk zal uitvoeren.	
Ik kan in mijn werk zelfstandig optreden.	
De vrijheid van handelen die mijn werkgever/leidinggevende mij toestaat, is voldoende.	
Er zijn mogelijkheden om mijn werk naar eigen inzicht te organiseren.	
Ik kan in mijn functie zaken zelfstandig afhandelen.	
Het uitvoeren van mijn werk geeft mij meteen informatie in hoeverre ik goed presteer.	
Ik kan uit de voortgang van mijn werk opmaken of ik goed presteer.	
Om te weten hoe ik mijn werk uitvoer, ben ik geheel aangewezen op de informatie van anderen.	
Ik kan zelf bijhouden hoe ik mijn werk uitvoer.	
In mijn werk weet je het nooit of je het goed doet.	
Het werk dat ik hier doe, is zinvol voor mij.	
De meeste dingen die ik in mijn functie moet doen, zijn zinvol.	
De meeste mensen die hetzelfde werk doen als ik, vinden het werk zinvol.	
Ik ben trots op het werk dat ik doe.	
Het werk dat ik in deze praktijk uitvoer, betekent veel voor mij.	
Ik voel mij verantwoordelijk voor mijn werk.	
Het is mijn eigen verantwoordelijkheid of het werk goed gedaan wordt.	
De resultaten van mijn werk zijn het gevolg van mijn eigen inspanningen.	
Ik maak me er druk over hoe het met mijn werk gaat.	

Wanneer er problemen zijn in mijn werk, zal ik er alles aan doen om die op te lossen.
Als ik met een taak (of opdracht) klaar ben, weet ik wat het resultaat is.
Ik weet altijd of ik mijn werk goed (of niet) heb uitgevoerd.
Ik vind het gemakkelijk om te bepalen of ik mijn werk goed heb uitgevoerd.
In mijn werk duurt het lang voordat ik weet of ik de juiste beslissing heb genomen.
Ik merk altijd aan de reacties van mijn collega's of ik mijn werk goed (of niet) heb gedaan.

26. Onderstaande stellingen hebben betrekking op de taaktoewijzing/taakdelegatie in uw praktijk.

Ik krijg tegenstrijdige opdrachten van mijn werkgever/leidinggevende.
Ik krijg tegenstrijdige verzoeken van mijn collega's.
Ik moet het werk op een andere manier doen dan ik zelf wil.
De mensen op mijn werk stellen tegenstrijdige eisen aan mij.
Het is duidelijk wat ik precies moet doen in mijn werk.
Het is mij duidelijk wat er in mijn werk van mij wordt verwacht.
Ik weet welke eisen aan mijn werk worden gesteld.
Ik weet wat collega's op mijn werk van mij verwachten.
Ik weet waarvoor ik verantwoordelijk ben.
Ik weet hoe mijn werkgever/leidinggevende over mijn prestaties denkt.
Ik weet hoe ik mijn werk moet uitvoeren om een goed resultaat te bereiken.

27. Naar welke van de onderstaande twee beschreven banen gaat uw voorkeur uit; ga er vanuit dat alle andere kenmerken van de baan hetzelfde zijn, kijk alleen naar de beschreven karakteristieken. Een voorkeur invullen.

1 - sterke voorkeur voor baan A
2 - een beetje voorkeur voor baan A
3 - neutraal
4 - een beetje voorkeur voor baan B
5 - sterke voorkeur voor baan B

Baan A. Een baan met een goed salaris.
Baan B. Een baan met mogelijkheden om creatief en innovatief te zijn.
Baan A. Een baan waarbij u vaak belangrijke beslissen moet nemen.
Baan B. Een baan met veel leuke collega's.
Baan A. Een baan waar degenen die het beste werk leveren grotere verantwoordelijkheid krijgen.
Baan B. Een baan waar de grootste verantwoordelijkheid gegeven wordt aan de loyale en seniore werknemers.
Baan A. Een baan bij een praktijk/bedrijf met financiële problemen – deze zou gesloten kunnen worden binnen een jaar.
Baan B. Een baan waarin u helemaal geen inbreng hebt in uw werkschema/planning of de procedures voor het uitvoeren van het werk.
Baan A. Een heel routinematige baan.
Baan B. Een baan met niet zo vriendelijke collega's.
Baan A. Een baan met een werkgever/leidinggevende die vaak in het bijzijn van anderen kritisch optreedt ten aanzien van u en uw werk.
Baan B. Een baan die u zou verhinderen om de vaardigheden te gebruiken waar u zo hard voor hebt gewerkt om deze aan te leren.
Baan A. Een baan met een werkgever/leidinggevende die u respecteert en eerlijk behandelt.
Baan B. En baan met mogelijkheden om constant nieuwe en interessante dingen te leren.
Baan A. Een baan waar een kans bestaat dat u ontslagen wordt.

Baan B. Een baan met erg weinig kans om uitdagend werk te doen.
Baan A. Een baan met een kans voor u om nieuwe vaardigheden te leren en vooruitgang te boeken in de organisatie.
Baan B. Een baan met veel vakantiedagen en goed secundaire arbeidsvoorwaarden pakket.
Baan A. Een baan met weinig vrijheid en onafhankelijkheid om uw werk te doen zoals u dit wilt.
Baan B. Een baan met slechte arbeidsomstandigheden.
Baan A. Een baan met teamwerk naar tevredenheid.
Baan B. Een baan die u toestaat om uw vaardigheden en bekwaamheden te gebruiken in de hoogste mate.
Baan A. Een baan die u weinig of geen uitdagingen biedt.
Baan B. Een baan die van u vereist om compleet geïsoleerd te zijn van de collega's.

Deel 4: Uw oordeel over uw huidige baan

28. Hoe is de mate van aansluiting tussen de gevolgde opleiding Mondzorgkunde en uw huidige functie wat betreft:

Antwoordmogelijkheden:

1 - geen of slechte aansluiting
2 - matige aansluiting
3 - redelijke aansluiting
4 - goede aansluiting
5 - uitstekende aansluiting

Kennis van uw eigen vakgebied
Vermogen om vakkennis in praktijk toe te passen
Vermogen op problemen en kansen te signaleren
Vermogen om verbanden te leggen tussen verschillende zaken- diagnose te stellen
Vermogen om behandelplan te maken
Vermogen om duidelijk te kunnen communiceren met de collega's
Vermogen om duidelijk te kunnen communiceren met de patiënten
Vermogen om zelfstandig de werkzaamheden uit te voeren
Aangeleerde vaardigheden
Praktijkervaring

29. In welke mate worden uw capaciteiten in uw huidige functie benut?

helemaal niet
enigszins
deels
grotendeels
(bijna) geheel

30. In welke mate schieten uw capaciteiten tekort voor uw huidige functie?

helemaal niet
enigszins
deels
grotendeels
(bijna) geheel

31. Onderstaande stellingen hebben betrekking op uw werktevredenheid in de huidige werksituatie.

Ik zie tegen mijn werk op.
Ik vind het prettig om aan de werkdag te beginnen.
Ik heb plezier in mijn werk
Ik doe mijn werk omdat het moet, maar daarmee is alles wel gezegd.
Mijn werk is uitdagend.
Het werk dat ik doe motiveert me.
Ik ben tevreden met het werk dat ik doe.
Het raakt me weinig of ik mijn werk wel of niet doe.
Ik ben tevreden over mijn functioneren.
Ik ben tevreden met de carrière voortgang die ik tot nu toe gemaakt heb in deze praktijk / organisatie.
Ik ben tevreden met mijn kansen voor carrière voortgang in de toekomst binnen deze praktijk / organisatie.
Ik ben tevreden met mijn salaris.
Ik vind mijn salaris in overeenstemming met mijn functie.

Appendix II: Questionnaire composition per sample

Questionnaire content	OS 1	OS 2	NS 1	NS 2
Demographic and work setting data				
Gender, age, experience, weekly working hours, practice type, number of colleagues	+	+	+	+
Graduation, kind of employment, number of dentist's chairs in the practice	-	+	+	+
Additional courses/education in caries treatment	-	+	-	-
Job content				
26 items on traditional tasks	+	+	+	+
16 items on caries diagnosis, caries treatment and extraction tasks	+	+	+	+
New 11 items on traditional tasks	-	+	+	+
New 22 items on tasks in cariology, policy making and scientific research	-	+	+	+
1 item on barriers for expanding tasks	-	+	+	+
Job characteristics				
24 items on job characteristics	+	+	+	+
11 items on role conflict	-	+	+	+
12 items on Growth Need Strength	-	-	+	-
Job satisfaction				
9 items on intrinsic job satisfaction	+	+	+	+
2 items on extrinsic job satisfaction	+	+	+	+
2 items on career satisfaction	-	+	+	+
12 items on the correspondence between tasks in education and actual job content	-	-	+	+

Appendix III: Patient questionnaire (the lay-out differs from the original questionnaire)

Onderzoek naar patiënten beleving van de mondzorg

Graag zouden we u een aantal vragen over uw ervaring in deze tandheelkundige praktijk willen stellen. Wij zijn benieuwd hoe u de zorg die u in deze praktijk ontvang ervaart. Uw antwoorden zullen volledig anoniem worden verwerkt. Dit betekent ook dat we over de hele groep patiënten terug rapporteren, nooit over individuele patiënten. Dit onderzoek maakt onderdeel van een groot onderzoek naar taakherschikking in tandheelkundige zorg van de Rijksuniversiteit en Hanzehogeschool in Groningen.
Schrijft u alstublieft ook uw opmerkingen aan het einde van deze vragenlijst indien u deze niet kwijt kon in een van de door ons gestelde vragen. Graag ontvangen wij de vragenlijst binnen 3 weken terug.

1. Wat is uw leeftijd; .....

2. Wat is uw geslacht?
○ man ○ vrouw

3. Hoe lang bent u patiënt bij deze praktijk? .....

4. Hoe vaak heeft u in het afgelopen jaar deze praktijk bezocht? .....keer

5. Hoe vaak per jaar komt u voor controle?
○ 2 x jaar
○ 1x jaar
○ Anders, namelijk.....

6. Kunt u in hieronder aangeven welke behandelingen bij u de afgelopen 12 maanden zijn uitgevoerd en door wie?

Soort behandeling	**Uitgevoerd door**			
	Tandarts	Mondhygiënist	Preventie assistent	Ik weet niet wie de behandeling heeft uitgevoerd
Controle van het gebit	○	○	○	○
Tandsteen verwijderen	○	○	○	○
Mondhygiëne controle en instructie	○	○	○	○
Diepe reiniging van pockets – tandsteen verwijderen onder het tandvlees	○	○	○	○
Bleken van tanden	○	○	○	○

Een vulling maken (een gaatje vullen)	○	○	○	○
Tand/kies trekken	○	○	○	○
Wortelkanaalbehandeling	○	○	○	○
Behandelen van gevoelige tandhalzen	○	○	○	○
Anders, namelijk.....	○	○	○	○
.....	○	○	○	○

7. Zou u een reactie willen geven op onderstaande stellingen? Als u in deze praktijk nooit door iemand van deze beroepsgroep bent behandeld vult u “niet van toepassing” in.

Beschikbaarheid – <u>ruimte in de agenda van de behandelaars</u> van deze praktijk	Hel. eens	Eens	Neutr.	Oneens	Hel. oneens	N.v.t
Het was gemakkelijk om een afspraak met de tandarts te maken	○	○	○	○	○	○
Het was gemakkelijk om een afspraak met de mondhygiënist te maken	○	○	○	○	○	○
Het was gemakkelijk om een afspraak met de preventie assistent te maken	○	○	○	○	○	○

8. De onderstaande stellingen gaan over de mondzorg die u <u>in deze praktijk over het algemeen</u> krijgt. Het gaat daarbij om uw eigen indruk. Onderaan kunt u toelichting geven over mogelijk wisselende ervaringen.

Stellingen	Hel. eens	Eens	Neutr.	Oneens	Hel. oneens	N.v.t
Na het gesprek met mijn behandelaar(s) in deze praktijk, weet ik hoe het staat met de gezondheid van mijn mond.	○	○	○	○	○	○
Na het gesprek met mijn behandelaar(s) in deze praktijk, heb ik een goed beeld van de veranderingen in de gezondheid van mijn gebit die ik de komende maanden kan verwachten.	○	○	○	○	○	○
Mijn behandelaar(s) in deze praktijk vertellen me alles wat ik wil weten over het probleem/de problemen met mijn gebit	○	○	○	○	○	○
Ik heb echt het gevoel dat mijn behandelaar(s) in deze praktijk mij begrijpen.	○	○	○	○	○	○
Ik had het gevoel dat mijn behandelaar(s) in	○	○	○	○	○	○

deze praktijk echt weten hoezeer ik me zorgen maak over mogelijke pijn.						
Ik heb het gevoel dat mijn behandelaar(s) in deze praktijk mij accepteren als persoon.	○	○	○	○	○	○
Mijn behandelaar(s) in deze praktijk gaan nauwgezet te werk tijdens de behandeling.	○	○	○	○	○	○
Mijn behandelaar(s) in deze praktijk zijn te ruw tijdens mijn behandeling.	○	○	○	○	○	○
Ik ben tevreden met wat mijn behandelaar(s) in deze praktijk doen.	○	○	○	○	○	○
Tijdens mijn bezoek lijken mijn behandelaar(s) in deze praktijk te weten wat zij doen.	○	○	○	○	○	○
Ik heb veel wisselende ervaringen met verschillende behandelaar(s)/ beroepsgroepen van deze praktijk gehad.	○	○	○	○	○	○

Toelichting over uw wisselende ervaringen met verschillende behandelaars/ beroepsgroepen. Ook andere opmerkingen over uw ervaringen in deze praktijk kunt u hier kwijt.

9. Stel dat u de volgende behandeling nodig hebt. Door wie laat u deze bij voorkeur uitvoeren? En waarom? (T=tandarts, M=mondhygienist, PA=preventie assistent)

Soort behandeling	**Ik laat deze behandeling het liefst door de volgende behandelaar uitvoeren**			**Waarom juist deze behandelaar? (U kunt meerdere redenen aankruisen)**
	T	M	PA	Vanwege .....(rondje aankruisen) ○ Persoonlijke bejegening ○ Tempo van werken ○ Vakbekwaamheid ○ Ruimte voor vragen ○ Kwaliteit van resultaat ○ Beschikbaarheid (Snel een afspraak maken) ○ Anders, namelijk.....
Controle van uw gebit	○	○	○	
Tandsteen verwijderen	○	○	○	Vanwege .....(rondje aankruisen) ○ Persoonlijke bejegening ○ Tempo van werken ○ Vakbekwaamheid ○ Ruimte voor vragen

				○ Kwaliteit van resultaat ○ Beschikbaarheid (Snel een afspraak maken) ○ Anders, namelijk.....
Mondhygiëne controle en instructie	○	○	○	Vanwege .....(rondje aankruisen) ○ Persoonlijke bejegening ○ Tempo van werken ○ Vakbekwaamheid ○ Ruimte voor vragen ○ Kwaliteit van resultaat ○ Beschikbaarheid (Snel een afspraak maken) ○ Anders, namelijk.....
Een vulling maken (gaatje vullen)	○	○	○	Vanwege .....(rondje aankruisen) ○ Persoonlijke bejegening ○ Tempo van werken ○ Vakbekwaamheid ○ Ruimte voor vragen ○ Kwaliteit van resultaat ○ Beschikbaarheid (Snel een afspraak maken) ○ Anders, namelijk.....
Tand/kies trekken	○	○	○	Vanwege .....(rondje aankruisen) ○ Persoonlijke bejegening ○ Tempo van werken ○ Vakbekwaamheid ○ Ruimte voor vragen ○ Kwaliteit van resultaat ○ Beschikbaarheid (Snel een afspraak maken) ○ Anders, namelijk.....
Wortelkanaal-behandeling	○	○	○	Vanwege .....(rondje aankruisen) ○ Persoonlijke bejegening ○ Tempo van werken ○ Vakbekwaamheid ○ Ruimte voor vragen ○ Kwaliteit van resultaat ○ Beschikbaarheid (Snel een afspraak maken) ○ Anders, namelijk.....

10. Bent u ooit door een mondhygiënist behandeld voor cariës – heeft een mondhygiënist wel eens een vulling bij u gemaakt (“gaatje gevuld”)?
○ ja, ga naar de volgende vraag ○ nee, ga naar vraag 12

11. Wat was uw ervaring met deze behandeling?
○ zeer goed ○ goed ○ slecht ○ zeer slecht

12. Zou u een reactie willen geven op onderstaande stellingen?

Stellingen	Hel. eens	Eens	Neutraal	Oneens	Hel. oneens	N.v.t.
Als ik naar een andere behandelaar binnen deze praktijk word gestuurd, is mij duidelijk wat de reden hiervoor is.	○	○	○	○	○	○
Als ik naar een andere behandelaar binnen deze praktijk wordt gestuurd, overlegt men dit eerst met mij.	○	○	○	○	○	○
Het is mij duidelijk welke deel van de zorg voor mijn gebit bij welke behandelaar ondergebracht is (m.a.w. wie wat doet).	○	○	○	○	○	○
Al mijn behandelaars in deze praktijk zijn goed op de hoogte van mijn mondsituatie.	○	○	○	○	○	○
Er vindt voldoende overleg plaats tussen de verschillende behandelaars over mijn mondsituatie.	○	○	○	○	○	○
Ik heb er moeite mee door verschillende mensen binnen deze praktijk te worden behandeld.	○	○	○	○	○	○
Ik ben tevreden met de hoeveelheid aandacht die medewerkers van deze praktijk aan mij besteden.	○	○	○	○	○	○
Ik zou liever bij een andere tandheelkundige praktijk onder behandeling zijn.	○	○	○	○	○	○

13. Op een schaal van 1 tot 10 geef ik aan deze praktijk het cijfer _____voor de ontvangen zorg.

14. Op een schaal van 1 tot 10 geef ik aan deze praktijk het cijfer _____voor de persoonlijke communicatie.

Opmerkingen:

Appendix IV: Items excluded from the factor analysis

Rontgenfoto's maken
Participeren in het maken van een behandelplan voor gecompliceerde patiënt
In teamverband uitvoeren van parodontale chirurgie
Bleken van gebitselementen
Vastzetten kroon
Nazorg bij implantaten
Hechtingen verwijderen
Kleine pijnklachten behandelen
Prothese beslijpen
Ik beslis zelfstandig om:
- gebitsafdrukken te maken
- rontgen foto te maken t.b.v. nazorg implantaten
- aanvullende diagnostische middelen te gebruiken

Appendix V: Task groups and items

1. Intake

Intake onderzoek bij nieuwe patiënten
Medische en tandheelkundige anamnese afnemen

2. Preventie

Voorlichting geven
Mondhygiëne instructie geven
Supragingivaal tandsteen verwijderen
Subgingivaal tandsteen verwijderen

3. Parodontologie diagnose/ behandel planning en uitvoerend

Diagnose stellen m.b.t. de parodontale aandoeningen
Zelfstandig behandelplan maken voor patiënten met parodontale aandoeningen
Herbeoordeling van de parodontale behandeling
Pocket/parodontiumstatus maken
Uitvoeren van Initiële behandeling bij patiënten met parodontale problematiek
Ik beslis zelfstandig om:
een röntgenfoto te maken t.b.v. diagnostiek van parodontale aandoeningen
een pocket/parodontiumstatus te maken

4. Orthodontie

Begeleiden en controle van patiënten met orthodontische apparatuur
Aanbrengen van orthodontische apparatuur
Verwijderen van orthodontische apparatuur
Ik beslis zelfstandig om:
een röntgenfoto te maken t.b.v.orthodontie

5. Anesthesie

Infiltratie anesthesie toedienen
Geleidingsanesthesie toedienen
Ik beslis zelfstandig om:
infiltratie anesthesie toe te dienen
geleidingsanesthesie toe te dienen

6. Caries diagnose en behandelplanning

Cariësdiagnostiek tijdens het mondonderzoek
Diagnose stellen m.b.t. de cariës
Diagnose stellen voor andere tandheelkundige aandoeningen
Zelfstandig behandelplan maken voor patiënten met cariës
Periodiek mondonderzoek bij de patiënten
Ik beslis zelfstandig om:
een röntgenfoto te maken t.b.v. cariës diagnostiek

7. Cariës beslissende taken

Ik beslis zelfstandig om:

- een eenvlaksrestauratie in melkgebit te leggen
- een eenvlaksrestauratie in blijvend gebit te leggen
- een meervlaksrestauratie in melkgebit te leggen
- een meervlaksrestauratie in blijvend gebit te leggen
- secundaire cariës te behandelen
- fissuren te sealen bij kinderen
- fissuren te sealen bij volwassen

8. Cariës uitvoerende taken

Eenvlakspreparatie in melkelementen
Eenvlaksrestauratie in melkelementen
Eenvlakspreparatie in blijvende elementen
Eenvlaksrestauratie in blijvende elementen
Meervlakspreparatie in melkelementen
Meervlaksrestauratie in melkelementen
Meervlakspreparatie in blijvende elementen
Meervlaksrestauratie in blijvende elementen
Sealant leggen met uitslijpen van fissuur
Sealant leggen zonder uitslijpen van fissuur
Polijsten en corrigeren van composiet restauraties
Polijsten en corrigeren van amalgaam restauraties
Secundaire cariës behandelen

9. Extracties

(Eenvoudige) extracties van melkelementen
(Eenvoudige) extracties van blijvende elementen
Ik beslis zelfstandig om:

- (eenvoudige) extractie van melkelementen uit te voeren
- (eenvoudige) extractie van blijvende elementen uit te voeren

10. Evidence based handelen

Wetenschappelijke literatuur gebruiken in mijn beslissingen t.a.v. de diagnose en behandelplan.
Wetenschappelijke literatuur raadplegen bij gecompliceerde gevallen/aandoeningen
Gegevens verzamelen t.b.v. het wetenschappelijk onderzoek

11. Tandheelkundige/ mondhygienische beleid

Deelnemen aan het bepalen van het tandheelkundige beleid in uw praktijk/organisatie
Deelnemen aan het bepalen van het beleid t.a.v. de zorg voor kinderen

Zelfstandig een preventieplan maken voor specifieke zorggroepen
Deelnemen aan het ontwikkelen van nieuwe protocollen/richtlijnen in uw praktijk/organisatie

12. Togepast wetenschappelijk onderzoek

Opzetten van een wetenschappelijk onderzoek
Analyseren van een wetenschappelijk onderzoek
Rapporteren van een wetenschappelijk onderzoek

Appendix VI: Participants' work situation at different times in the study

DH Case	At t1 (2007)	At the time of the interview (2008)	At t2 (2009)	Remark
IS	Two general dental practices, total 32 hours in employment 16 hours in Iceland	Same	Same	Comparison t2-t1 is possible
PL	Two general dental practices, total 40 hours in employment, 16 hours in Poland	Total 38 hours, 16 hours in Poland	Same	Comparison t2-t1 is possible
DE	Three general dental practices with two employers, total 35 hours, in employment 16 hours for the employer-participant; 8 hours in Greece (location A) and 8 hours at location B	Same	total 34 hours left location B and working 12 hours in practice Greece (location A)	At t1 the questionnaire filled out for location B, the interview and t2 data are from location A. Comparison t2-t1 is partly possible Left Greece two months after t2 and started his own practice within the dental practice of his other employer
USA	Two practices; general dental practice and IDHP , total 40 hours in employment 26 in USA	Same	Three practices; two general dentist practices and one IDHP , total 28 hours, left practice USA	Comparison not possible: participant left USA shortly after the interview, t2 data based on job in other practice
SE	Two general dental practices, total 30 hours in employment, 16 hours in practice X (within a complex of three dentist practices side by side)	Left practice X and started in Sweden, other practice within the complex 10 hours in Sweden (3 hours filling in for a colleague)	Two general dentist practices, total 28 hours, 7 hours in practice Sweden	Comparison not possible; the questionnaire at t1 and t2 filled in for other practice
CH	Two practices; general dentist practice and 'oral care practice'-former independent dental hygiene practice total 32 hours in employment, 16 hours in practice Switzerland	Same	total hours 28, still 16 hours in Switzerland	Comparison t2-t1 is possible

Appendix VII: Cattell's salient similarity index

Cattell's salient similarity index (*s*) is used to compare two solutions' patterns of loadings comparing the factor structure in one population with that in another. Each loading is classified as Positively Salient (criterion>.10), Negatively Salient (criterion <.10) or neither (HyperPlane).

A third order square [PS, HP, NS] matrix comparing Group 1 with Group 2.

		Group 1		
		PS	HP	NS
	PS	11	12	13
Group2	HP	21	22	23
	NS	31	32	33

Catell's *s* is computed from these counts this way:

$$s = \frac{11+33-13-31}{11+33+13+31+.5(12+21+23+32)}$$ (The numbers here are cell indices.)

S- can be converted to an approximate significance level, P, testing the null hypothesis that the two factors (one form population 1, one from popuilaiton 2) being compared are not related to one another. See tables in Catell et al. (1969).

Factor VAR

	Old style		
New style	PS	HP	NS
PS	3	2	0
HP	0	19	0
NS	0	0	0

S=.75 with 80% of hyperplane counts P<.001

Factor IDEN

	Old style		
New style	PS	HP	NS
PS	4	2	0
HP	1	17	0
NS	0	0	0

S=.73 with 71% of hyperplane counts P<.001

Factor SIG

	Old style		
New style	PS	HP	NS
PS	5	2	0
HP	0	17	0
NS	0	0	0

S=.83 with 71% of hyperplane counts P<.001

Factor 1 AUT

	Old style		
New style	PS	HP	NS
PS	7	0	0
HP	3	14	0
NS	0	0	0

S=.82 with 58% of hyperplane counts P<.001

Factor 1 FB

	Old style		
New style	PS	HP	NS
PS	3	4	0
HP	0	16	1
NS	0	0	0

S=.55 with 66% of hyperplane counts P<.002

Factor NEG

	Old style		
New style	PS	HP	NS
PS	2	0	0
HP	1	21	0
NS	0	0	0

S=.80 with 88% of hyperplane counts P<.001

Appendix VIII: Job characteristics and job satisfaction in five clusters

Job characteristics scales, mean (sd)	Clusters					ANOVA test
	1	2	3	4	5	
Job characteristics						
Skill variety	3.65 (0.77)	3.54 (0.83)	3.88 (0.69)	4.23 (0.72)	4.45 (0.55)	**<0.001**
Task identity	4.27 (0.51)	4.14 (0.56)	4.36 (0.49)	4.32 (0.48)	4.39 (.47)	**0.003**
Task significance	4.18 (0.56)	4.09 (0.60)	4.44 (0.50)	4.32 (0.50)	4.53 (0.45)	**<0.001**
Autonomy	4.54 (0.51)	4.28 (0.56)	4.57 (0.48)	4.30 (0.53)	4.56 (0.49)	**<0.001**
Feedback from job	4.01 (0.56)	3.83 (0.51)	4.07 (0.54)	3.86 (0.51)	4.02 (0.55)	**0.001**
Job complexity	4.12 (0.41)	3.98 (0.39)	4.25 (0.36)	4.20 (0.39)	4.40 (0.36)	**<0.001**
Role conflict and role ambiguity						
Role conflict	1.45 (0.56)	1.56 (0.51)	1.52 (0.55)	1.72 (0.63)	1.73 (0.58)	**0.001**
Role ambiguity	4.27 (0.65)	4.37 (0.45)	4.42 (0.54)	4.36 (0.46)	4.46 (0.48)	0.116
Job satisfaction						
Intrinsic JS	4.24 (0.58)	4.14 (0.58)	4.42 (0.50)	4.36 (0.46)	4.46 (0.48)	**<0.001**
Extrinsic JS	3.91 (0.87)	3.44 (1.12)	3.86 (1.10)	3.61 (0.98)	3.73 (0.90)	**0.001**
Career satisfaction	3.91 (0.83)	3.55 (1.02)	4.19 (0.89)	3.93 (0.82)	4.04 (0.71)	**<0.001**

Post-hoc analysis - The statistically significant differences between the clusters; eg. cluster 1 skill variety scores significantly differ compared to the clusters 3,4 and 5. (ANOVA)

Job characteristics and job satisfaction	Clusters 1	2	3	4	5
Job characteristics					
Skill variety	3,4,5	3,4,5	1,2,4,5,	1,2,3	1,2,3
Task identity	2	1,3,4,5	2	2	2
Task significance	3,4,5	3,4,5	1,2	1,2,5	1,2,4
Autonomy	2,4	1,3,5	2,4	1,3,5,	2,4
Feedback from job	2,4	1,3,5	2,4	1,3	2
Job complexity	2,3,5	1,3,4,5	1,2,5	2,5	1,2,3,4
Role conflict and role ambiguity					
Role conflict	4,5,	4,	4,5	1,2,3	1,3
Role ambiguity	3,5		1		1
Job satisfaction					
Intrinsic JS	3	3,4,5	1,2	2	2
Extrinsic JS	2,4	1,3	2	1	
Career satisfaction	2,3	1,3,4,5	1,2,4	2,3	2

Appendix IX: Correlation matrix task groups, job characteristics and job satisfaction scales in new style group t2 – t1 (n=50)

	Skill variety	Task identity	Task significance	Autonomy	Feedback from job	Job complexity	Intrinsic job satisfaction	Extrinsic job satisfaction	Career satisfaction
Intake	,029	-,102	-,068	-,208	-,100	-,138	-,195	-,148	,025
Periodontology	,119	-,056	,011	-,236	-,055	-,069	-,091	,021	,068
Prevention	-,027	-,053	-,029	-,064	-,016	-,082	-,199	-,036	,240
Orthodontics	-,081	,019	-,132	,187	,114	,037	-,180	**-,338(*)**	-,116
Local anaesthesia	,032	,003	**,379(**)**	-,183	-,210	,036	-,039	,058	,059
EBP	**,333(*)**	,176	-,049	,219	,125	**,289 (*)**	-,025	,237	,257
Extraction	,235	-,164	,006	,032	-,133	,050	,238	,264	,092
Caries treatment	**,356(*)**	,164	,235	-,050	,071	**,359(*)**	-,068	,023	-,025
Caries decision tasks	**,494(**)**	,076	-,006	,077	,163	**,377(**)**	,007	,107	,133
Caries diagnosis and treatment planning	,232	-,234	,010	-,223	-,165	-,068	-,122	-,066	,120
Oral health policy	,198	,023	,122	-,017	,200	,157	,070	**,349(*)**	-,039
Applied research	-,018	,189	**,368(**)**	,063	,000	,157	,016	-,063	,130

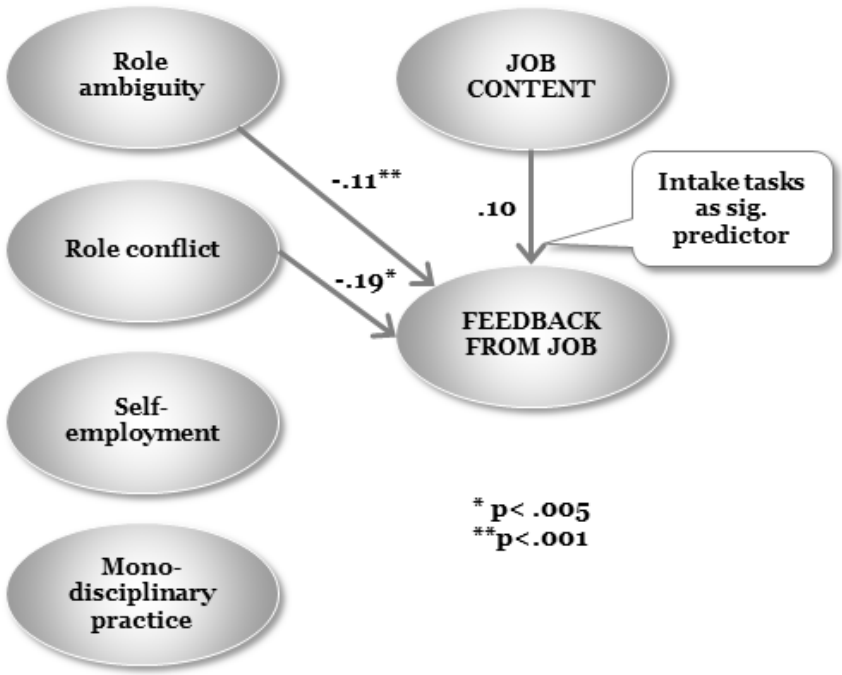
	Skill variety	Task identity	Task significance	Autonomy	Feedback from job	Job complexity	Intrinsic job satisfaction	Extrinsic job satisfaction	Career satisfaction
Skill variety	1,000								
Task identity	,403(**)	1,000							
Task significance	,028	,207	1,000						
Autonomy	,094	,191	-,066	1,000					
Feedback from job	,024	,169	-,058	,258	1,000				
Job complexity	,644(**)	,697(**)	,403(**)	,526**	,514**	1,000			
Intrinsic job satisfaction	,303(*)	,100	,097	,248	-,091	,255	1,000		
Extrinsic job satisfaction	,340(*)	,059	,172	,376**	-,063	,323*	,557(**)	1,000	
Career satisfaction	,379(**)	,036	-,083	,055	-,212	,129	,492(**)	,448(**)	1,000

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Appendix X: Variance explained for feedback from job

R^2=9.1, F=12.1290, df=5, 562, p<.001



Appendix XI: Confirmatory Factor Analysis Standardized Loadings

Construct	Item	Factor Loadings	T-Value	Cronbach's α
Oral healthcare policy and EBP	EBP2	.39	8.80	α =.75
	BE1	.73	18.26	
	BE3	.69	16.88	
	BE4	.84	21.60	
Intake	IN1	.73	12.94	α =.72
	IN2	.83	13.85	
Caries diagnosis	DI2	.79	18.03	α =.72
	DI3	.86	19.53	
Caries decisive tasks	CA 7	.92	28.83	α =.95
	CA8	1.00	33.07	
	CA10	.92	28.71	
Local anesthesia	AN1	.86	19.83	α =.81
	AN2	.85	19.51	
Skill variety	VAR2	.48	11.99	α =.85
	VAR3	.93	28.99	
	VAR4	.97	31.05	
	VAR5	.80	22.83	
Autonomy	AU1	.79	20.94	α =.85
	AU2	.79	21.03	
	AU4	.78	20.48	
	AU5	.69	17.48	
Role conflict	RCO1	.77	19.50	α =.78
	RCO2	.83	21.46	
	RCO4	.73	18.31	
Job satisfaction	JS1	.57	14.17	α =.85
	JS2	.59	14.95	
	JS4	.52	12.66	
	JS5	.86	25.08	
	JS6	.90	26.66	
	JS7	.77	21.20	
	JS8	.48	11.65	
χ^2=833.81, df=398, RMSEA=.046, NFI=.95, CFI=.97, GFI=.91				

Appendix XII: Factor analysis of job characteristics items by LISREL 8.8.

Old style group

Construct	Item	Factor Loadings	T-Value	Cronbach's α
Skill variety	VAR1	.41	8.38	α =.85
	VAR2	.39	7.96	
	VAR3	.91	23.01	
	VAR4	.98	26.27	
	VAR5	.78	18.44	
Tisk identity	ID1	.71	15.25	α =.82
	ID2	.74	16.26	
	ID3	.61	12.62	
	ID4	.71	15.33	
	ID5	.69	14.79	
Task significance	SIG1	.82	17.80	α =.66
	SIG2	.40	7.64	
	SIG3	.45	8.64	
	SIG4	.79	17.05	
Autonomy	AU1	.86	20.42	α =.63
	AU2	.83	19.27	
	AUT3	.11	2.08	
	AU4	.74	16.33	
	AU5	.70	15.21	
Feedback from job	FB1	.80	17.42	α =.61
	FB2	.90	21.19	
	FB3	.15	2.90	
	FB4	.55	11.18	
	FB5	.21	4.03	

χ^2=737.62, df=241, RMSEA=.071, NFI=.92, CFI=.94, GFI=.87

New style group

Construct	Item	Factor Loadings	T-Value	Cronbach's α
Skill variety	VAR1	.55	8.43	α =.90
	VAR2	.59	9.23	
	VAR3	.97	19.04	
	VAR4	.96	18.50	
	VAR5	83	14.52	
Tisk identity	ID1	.66	9.74	α =.77
	ID2	.68	10.00	
	ID3	.63	9.15	
	ID4	.63	9.17	
	ID5	.57	8.17	
Task significance	SIG1	.75	11.41	α =.76
	SIG2	.63	9.25	
	SIG3	.70	10.43	
	SIG4	.74	11.29	
Autonomy	AU1	.68	10.29	α =.82
	AU2	.74	11.71	
	AUT3	.61	9.04	
	AU4	.79	12.61	
	AU5	.67	10.18	
Feedback from job	FB1	.71	10.51	α =.60
	FB2	.76	11.48	
	FB3	.13	1.70	
	FB4	.65	9.45	
	FB5	.28	3.68	

$\chi 2$=434.91, df=241, RMSEA=.058, NFI=.92, CFI=.96, GFI=.86

Samenvatting in het Nederlands (Summary in Dutch)

De niet op elkaar afgestemdezorgaanbod en zorgvraag in Nederland leidde tot de introductie van taakherschikking in de gezondheidszorg. Er zijn nieuwe beroepen (bijv. physician assistant) en vervolgberoepen (bijv. nurse practitioner) ontstaan die taken van medici overgenomen hebben. Daarnaast hebben sommige beroepen meer bevoegdheden en bijbehorende scholing gekregen waardoor ook voorheen medische taken konden worden verschoven naar andere, aangrenzende beroepen. Bij het beroep mondhygiënist is een vergelijkbare ontwikkeling ingezet.

Vanaf het ontstaan van het beroep mondhygiënist in Nederland in de jaren 60 van de vorige eeuw is er beweging geweest in de toename van de deskundigheid en de bevoegdheden van de mondhygiënist. De meest recente ontwikkeling betreft de directe toegankelijkheid van de mondhygiënist en de functionele zelfstandigheid voor enkele voorbehouden handelingen. Deze ontwikkelingen zijn door de overheid ingezet om het verwachte tekort aan tandartscapaciteit op te vangen. Eén van de belangrijkste voorwaarden voor taakherschikking in de mondzorg en de uitbreiding van taken bij de mondhygiënisten is de bereidheid van tandartsen om enkele taken uit handen te geven.

Dit proefschrift richt zich op de daadwerkelijk taakverdeling tussen tandartsen en mondhygiënisten, de condities waaronder de ingezette veranderingen tot een ander takenpakket van de mondhygiënist hebben geleid, en de gevolgen van veranderingen in het takenpakket voor de werktevredenheid van de professionals.

Het onderzoek combineert de theoretische kaders van Hackman en Oldhams' Job Characteristics Model (JCM) en Abbott's System of professions. JCM is een model voor de relatie tussen op taakkenmerken gebaseerde complexiteit en werktevredenheid, maar de rol van maatschappelijke en lokale situatiefactoren blijven in dit model onderbelicht. Abbott's werk richt zich daarentegen op het maatschappelijke analyseniveau; het beschrijft de competitieve relatie tussen beroepen op hun weg naar professionalisering en naar uitbreiding en behoud van op taakcomplexiteit gebaseerde autonomie. Uitgaande van deze onderlinge afhankelijkheid tussen beroepen, is het de vraag in hoeverre en hoe deze competitieve verhouding tussen beroepen op het maatschappelijk niveau zich vertaalt in de verhoudingen in de lokale praktijken en tussen individuele beroepsbeoefenaars. De bijdrage aan JCM betreft de relatie tussen het daaruit volgende objectieve takenpakket en de ervaren taakkenmerken met inachtneming van relevant gebleken organisatiefactoren, welke binnen het JCM als context satisfactie kunnen worden beschouwd. Ook staat de stabiliteit van de vijf taakkenmerken van JCM in dit onderzoek ter discussie. Gebaseerd op bovenstaande vragen uit de praktijk en de theorie werden de volgende vraagstellingen voor dit proefschrift geformuleerd:

Vraag 1: Welke maatschappelijke, organisatorische en individuele factoren dragen bij aan de mate waarin taken worden herverdeeld tussen tandartsen en mondhygiënisten, en hoe beïnvloedt de resulterende taakverdeling de werktevredenheid van de professionals en de tevredenheid van de patiënten?

Vraag 2: In welke mate is de structuur van de ervaren taakkenmerken stabiel bij de veranderingen in het takenpakket?

Vraag *3: Wat is de relatie tussen het takenpakket, ervaren taakkenmerken en de werktevredenheid bij professionals met een verschillend takenpakket en wat is het effect van rol conflict, rol onduidelijkheid en Growth Need Strenght (GNS) op deze relatie?*

Kwalitatieve en kwantitatieve data zijn verzameld om antwoorden op deze vragen te kunnen geven. Er zijn vier surveys gedaan onder de verschillende subpopulaties van de Nederlandse mondhygiënisten. Hierbij zijn twee groepen mondhygiënisten onderscheiden; mondhygiënisten met een 2 of 3-jarige opleiding – zgn. oude stijl mondhygiënisten en met een 4-jarige opleiding – zgn. nieuwe stijl mondhygiënisten. De vragenlijst bevatte vragen naar demografische gegevens, takenpakket, taakkenmerken, werkomgeving (o.a. rol conflict en rol onduidelijkheid), Growth Need Strenght (GNS) (de wil om te ontplooien), werktevredenheid en de aansluiting tussen opleiding en werk. Er zijn daarnaast case studies gedaan in zes tandheelkundige praktijken, welke werden geselecteerd op basis van de survey data; aanvullende data zijn hier verzameld door middel van interviews met de 4-jarig opgeleide mondhygiënist en met de tandarts (eigenaar van de praktijk), een korte vragenlijst naar werktevredenheid van de tandarts en de preventie assistente(s) in de praktijk, en een vragenlijst onder de patiënten van de betreffende praktijk over hun tevredenheid van de ontvangen zorg.

Hoofdstuk 3 behandelt de eerste onderzoeksvraag naar de maatschappelijke, organisatie- en individuele factoren die de herverdeling van taken tussen tandartsen en mondhygiënisten beïnvloeden. Uitgebreide beschrijvingen en vergelijkingen van de werkverdeling in de zes tandheelkundige, dus multidisciplinaire, praktijken zijn in dit hoofdstuk opgenomen. Het blijkt dat de formele veranderingen op maatschappelijk niveau, met betrekking tot opleiding en wetgeving alleen, niet voldoende zijn om de herverdeling van taken tot stand te brengen. Hoewel de nieuwe stijl mondhygiënisten gemiddeld een uitgebreider takenpakket hebben dan de oude stijl mondhygiënisten, is het verschil niet zodanig dat we kunnen concluderen dat de ingezette taakherschikking is gerealiseerd. Veel blijkt af te hangen van de werksetting en daarmee samenhangende organisatie- en individuele factoren.

De organisatie- en individuele factoren hebben een grote invloed op de (her)verdeling van taken De verhoudingen tussen de beroepen op macro niveau,

zoals Abbott deze beschrijft, spelen hier wel in door, maar het zijn vooral organisatie- en individuele factoren die de variatie in de verdeling van de taken blijken te kunnen verklaren. Met betrekking tot de organisatie factoren zorgt een onvoldoende op de zorgvraag afgestemd lokaal zorgaanbod voor stagnatie in de (her)verdeling van taken tussen individuele tandartsen en mondhygiënisten. Als mondhygiënisten voldoende taken hebben op het gebied van preventie en parodontologie resteert eenvoudigweg weinig tot geen tijd om het takenpakket verder uit te breiden. Het zijn mede de kleine parttime aanstellingen van veel mondhygiënisten die deze gebrekkige afstemming van lokale zorgvraag en zorgaanbod in de hand werken. Als laatste, werd een duidelijk verschil gevonden tussen takenpakketten van mondhygiënisten die een baan hebben overgenomen van een oude stijl mondhygiënist ten opzichte van het takenpakket van de mondhygiënisten die een nieuwe positie hadden gecreëerd. In dit laatste geval werd meer ruimte ervaren of genomen om een takenpakket samen te stellen dat is afgestemd op de competenties en behoeften van de mondhygiënist, wat tot positieve uitkomsten in ervaren taakcomplexiteit en werktevredenheid van deze professional leidt.

De individuele factoren van tandartsen en mondhygiënisten, en in het bijzonder interpersoonlijke factoren tussen beide, blijken de grootste invloed te hebben op de (her)verdeling van taken tussen de professies. De individuele houding ten aanzien van de ontwikkelingen in mondzorg met betrekking tot de verschuiving van taken en bevoegdheden tussen de beroepen, de bereidheid van de tandarts om taken te delegeren, en de competenties en zelfeffectiviteit van de mondhygiënisten zijn belangrijke individuele factoren voor de (her)verdeling van taken. Onder de interpersoonlijke factoren is het vooral de mening van de tandarts over de competenties van de mondhygiënist die een rol speelt in het besluit om takenpakket en vooral de autonomie van de mondhygiënist uit te breiden. De meeste tandartsen zijn bereid om taken te delegeren, onder voorwaarde dat de tandartsen hun autoriteit behouden. De meeste nieuwe stijl mondhygiënisten ambiëren wel een uitgebreider takenpakket maar streven, opvallend genoeg, niet zo zeer naar meer bevoegdheden in termen van de daarmee samengaande grotere verantwoordelijkheid. In dit opzicht lijkt er verschil te zijn in de doelstellingen van het beroep op maatschappelijk niveau en die van individuele professionals. De eindconclusie is dat vooral de individuele en interpersoonlijke factoren een doorslaggevende rol spelen bij de werkverdeling in tandheelkundige praktijken. Aangezien de organisatie en werkstructurering in tandheelkundige praktijken vaak afhangt van het beleid van een tandartseigenaar, wordt nogmaals de significantie van de individuele factoren voor de werkverdeling in deze praktijken benadrukt.

In hoofdstuk 4 is de studie naar de stabiliteit van het JCM beschreven in relatie tot een veranderd takenpakket; welke condities beïnvloeden de stabiliteit en de dimensionaliteit van het JCM? In het verleden zijn er veel studies gedaan naar deze

vraag, echter met verschillende uitkomsten. In ons onderzoek hebben we rekening gehouden met enkele conceptuele en methodologische beperkingen van eerdere studies, zoals onderzoek in veel verschillende praktijken, onder dezelfde groep professionals met verschillend takenpakket en het gebruik van een hoger aantal items met een minimum aantal aan negatief gestelde items. De resultaten van beide, exploratieve (EFA) en confirmatieve factoranalyse (CFA) op de drie van de vier survey data zijn met elkaar vergeleken. Overeenkomend met eerdere studies hebben wij in EFA een aparte factor gevonden waar alle negatief geformuleerde items op laden. Verder wordt op basis van de EFA bij de groep oude stijl mondhygiënisten taak variatie verdeeld in twee aparte factoren, namelijk 1. variatie in taken en 2. mogelijkheid om alle competenties te gebruiken. In de nieuwe stijl groep is hier geen onderscheid in gevonden, alle taak variatie items laadden op een en dezelfde factor. De CFA laat overigens wel een vrij stabiele 5-factor oplossing zien.. Enkele items over het taakkenmerk 'Feedback uit het werk' vertoonden wel inconsistente factorladingen, hetgeen bij deze beroepsgroep lijkt te wijzen op de beperkte mogelijkheid voor mondhygiënisten om directe feedback uit werk te krijgen in verband met de langdurige behandelingen waarin de therapietrouw van de patiënt een cruciale rol speelt. Een subanalyse onder mondhygiënisten werkzaam in vrijgevestigde mondhygiëne praktijken en de mondhygiënisten werkzaam in de algemene tandheelkundige praktijken, laat zien dat de vrijgevestigde mondhygiënisten onderdelen van taakbelangrijkheid als autonomie ervaren en dat onderdelen uit autonomie soms als taak variatie of taakidentiteit worden gezien. De verklaring hiervoor is dat de meeste mondhygiënisten werkzaam in een vrijgevestigde praktijk zelfstandige ondernemers zijn. Concluderend, kunnen we stellen dat het JCM een geschikt instrument is om de taakcomplexiteit van de mondhygiënisten te meten. Wel moet rekening worden gehouden met het zelfstandig ondernemerschap van een deel van de mondhygiënisten en de beperkte mogelijkheden van deze beroepsgroep om directe feedback uit het werk te krijgen.

In hoofdstuk 5 wordt antwoord gegeven op de vraag in hoeverre een verschillend takenpakket van de oude en nieuwe stijl mondhygiënisten samenhangt met de ervaren taakcomplexiteit en werktevredenheid in beide groepen. Gebaseerd op de bevindingen uit het hoofdstuk 3 over het belang van interpersoonlijke factoren voor de werkverdeling en werktevredenheid, en de op theoretische gronden verwachte competitieve verhouding tussen beroepsgroepen, is het effect van rolconflict op de relaties binnen het JCM getest. Aan de hand van een zevental hypotheses werden de relaties tussen taakinhoud, taakkenmerken (taakcomplexiteit), rolconflict en werktevredenheid getoetst. We vonden een positieve relatie tussen de uitbreiding van het takenpakket en de mate van taakcomplexiteit, maar de uitbreiding van taken blijkt geen directe invloed te hebben op de werktevredenheid. Structual equation modeling laat zien dat de relatie tussen het takenpakket en de werktevredenheid grotendeels gemedieerd wordt door taakkenmerken.

De nieuwe stijl mondhygiënisten als groep blijken ondanks hun gemiddeld uitgebreidere takenpakket, toch geen significant hogere taakcomplexiteit en werktevredenheid te ervaren. De nieuwe stijl mondhygiënisten blijken veelal wat minder tevreden te zijn met hun baan in vergelijking met de oude stijl mondhygiënisten. De eerste verklaring is dat de nieuw opgeleide mondhygiënisten significant meer rolconflict blijken te ervaren dan de oud opgeleide mondhygiënisten wat de taakcomplexiteit en de werktevredenheid negatief beïnvloedt. Het effect van rolconflict op werktevredenheid wordt overigens niet gemedieerd door de taakcomplexiteit; rolconflict blijft een directe voorspeller voor werktevredenheid ook na het toevoegen van taakcomplexiteit in het toetsmodel. Bovendien modereert rolconflict de relatie tussen enkele individuele taken en autonomie onder de oud opgeleide mondhygiënisten. De tweede verklaring voor de lagere werktevredenheid onder de nieuw opgeleide mondhygiënisten is dat het merendeel van de oude stijl mondhygiënisten werkzaam is in een vrijgevestigde mondhygiëne praktijk, die overigens, ondanks hun beperkter takenpakket tevredener zijn met hun werk in vergelijking met de mondhygiënisten in de algemene tandheelkundige praktijken.

Taak variatie en autonomie blijken de hoogste voorspellers voor werktevredenheid van mondhygiënisten te zijn. De tendens is dat deze twee taakkenmerken zich in tegenovergestelde richting ontwikkelen: de mondhygiënisten met een uitgebreid takenpakket ervaren meer taakvariatie maar minder autonomie en de mondhygiënisten met een beperkt taakinhoud ervaren minder taak variatie maar daarentegen meer autonomie. Onze studie laat zien dat de mondhygiënisten die zich met de detectie, diagnose, en behandeling van cariës bezig houden meer afhankelijk zijn van de tandarts en daardoor minder autonomie ervaren, ten opzichte van de mondhygiënisten die uitsluitend taken in preventie en parodontologie uitvoeren en daarin een grotere mate van autonomie ervaren. In het eerste cohort van de nieuw opgeleide mondhygiënisten werden over een periode van twee jaar enkele kleine, maar geen significante verschillen gevonden in hun takenpakket, taakcomplexiteit en werktevredenheid. Concluderend kan gesteld worden dat alleen verbreding van takenpakket door toevoeging van nieuwe taken niet voldoende is voor een positief effect op de ervaren taakcomplexiteit en werktevredenheid; de verrijking van het taakpakket, in termen van toevoegen van nieuwe verantwoordelijkheden is hiervoor een vereiste. Niet alle mondhygiënisten blijken hier op dit moment voor open te staan, en dit geldt zeker ook voor de tandartsen.

Hoofdstuk 6 bespreekt de theoretische en praktische implicaties van de studies. Het begrip taakcomplexiteit wordt in dit onderzoek op individueel analyseniveau benaderd vanuit het perspectief van het JCM en op maatschappelijk niveau vanuit Abbott's theorie over het systeem van professies. JCM focust op de individuele professional die een hoge mate van taakcomplexiteit en werktevredenheid

nastreeft, en Abbott beschrijft de professies die een hogere taakcomplexiteit nastreven om zo hun taakdomein en autoriteit te vergroten en te andere beroepsgroepen daarvan uit te sluiten. Ons onderzoek laat, in lijn met voorgaand onderzoek, een U-vormige relatie zien tussen de zwaarte van de takenpakket en de werktevredenheid; als de zwaarte van het takenpakket de mogelijkheden van de professionals overschrijdt beïnvloedt het takenpakket de werktevredenheid negatief. Dit geldt ook op het niveau van professie, die de negatieve effecten van taakuitbreiding kan ervaren als de professie niet voldoende is uitgerust om alle taken en verantwoordelijkheden adequaat te vervullen.

De theoretisch competitieve relatie tussen professies op maatschappelijk niveau werd in dit onderzoek binnen het JCM op individueel analyseniveau gerepresenteerd met de variabele rol conflict. In de literatuur bestaat nog geen consensus over de interactie van rol conflict met de taakontwerp-variabelen binnen het JCM. In onze studie blijkt rolconflict een sterk effect te hebben op de ervaren taakcomplexiteit en werktevredenheid; in zoverre dat de positieve uitkomsten van uitbreiding van een takenpakket veelal teniet worden gedaan door een gemiddeld hogere mate van ervaren rol conflict die gepaard gaat met deze taakuitbreiding/-verrijking in een inter-professionele setting.

Het gegeven dat het JCM ruim 30 jaar geleden ontwikkeld en getest is doet vragen rijzen naar de bruikbaarheid en toepasbaarheid van het JCM onder de huidige generatie werkers, en meer specifiek professionals. Onze studie laat zien dat de huidige generatie werkers de banen tot op zekere mate aanpast aan de eigen wensen en competenties. Het werk van tegenwoordig verschilt ook ten opzichte van 30 jaar geleden en wordt gekarakteriseerd door technologische veranderingen, groeiende competitie, groei van kennis-gebaseerd en complex werk, onderlinge afhankelijkheid, en veranderingen in de werk contracten. Wij onderkennen de behoefte aan de integratie van andere theorieën in het JCM, zoals job crafting theorie die heel goed past bij de ontwikkeling van de individueel beroepsbeoefenaar in zijn zoektocht naar de meest optimale werkcomplexiteit en werktevredenheid.

Op basis van dit onderzoek dient self-employment als context variabele geintegreerd te worden in het JCM. Self-employment blijkt positief in relatie te staan met de ervaren autonomie, zorgt voor een diversiteit in de interpretatie van de ervaren taakkenmerken in onze populatie en veroorzaakt verschillen in de dimensionaliteit van het JCM. Een andere suggestie betreft het niveau van analyse in het JCM. De ervaren taakkenmerken en werktevredenheid in een baan zijn afhankelijk van de werkgerelateerde ervaringen van de professionals in hun andere banen. Mondhygiënisten blijken banen zodanig te combineren dat ze een optimale taakcomplexiteit en werktevredenheid over het geheel ervaren. Onze aanbeveling is om het niveau van analyse in het JCM te baseren op een individu in plaats van een enkele baan; alleen op deze manier kunnen uitspraken worden gedaan over de algehele ervaren taakcomplexiteit en werktevredenheid van een professional.

Dit onderzoek heeft diverse praktische implicaties voor verschillende partijen. Als eerst concluderen we dat de taakherschikking zoals door de overheid is ingezet zijn weg naar de praktijk (nog) niet heeft gevonden. Verschillende belemmeringen spelen een rol; onbekendheid van de patiënten en de tandartsen over de nieuwe bekwaamheden en bevoegdheden van de mondhygiënisten, maatschappelijke en organisatorische belemmeringen in termen van onbalans tussen (locale) zorgaanbod en zorgvraag en de persoonlijke visie van tandartsen over de rol van de mondhygiënist in de mondzorg alsmede de beperkte vertrouwen in competenties van de mondhygiënisten in de uitgebreide takenpakket. Om de mondhygiënisten optimaal in de zorg in te zetten zijn er aanbevelingen gedaan op verschillende niveaus. Vanuit maatschappelijk oogpunt speelt een niet afgestemde zorgvraag en zorgaanbod een grote rol. Zolang er niet voldoende professionals zijn om de preventieve taken en de parodontale zorg te bieden, zal de taakherschikking in tandheelkunde niet gerealiseerd worden. De bekendheid en de promotie van het beroep mondhygiëne onder de patiënten zou taakherschikking in tandheelkunde kunnen stimuleren. Wij hebben gevonden dat de inter-professionele relatie tussen de twee beroepen in kwestie op maatschappelijk niveau verschilt van de inter-professionele relaties op organisatie en inter-persoonlijke niveau. Daarom, zou de stimulans van taakherschikking op het niveau van organisatie en individuele factoren volgens ons meer effect kunnen behalen. Vergroten van mondhygiënisten aanstelling per praktijk, betere samenwerking tussen de mondhygiënist en de preventie assistent zijn voor de organisaties suggesties om de nieuw opgeleide mondhygiënisten optimaal in te zetten. Bovendien, groeien de kansen voor een optimaal inzet van mondhygiënisten in een tandheelkundige/mondzorg praktijk naarmate de competenties en de wensen van de mondhygiënist betrokken worden in het creëren van de baan voor deze professional.

Ons onderzoek laat zien dat nieuw opgeleide mondhygiënisten zich aan de bestaande praktijk aanpassen en niet vasthouden aan de professionele socialisatie die wordt aangereikt in de opleiding. Meer communicatie tussen het werkveld en de opleidingen is nodig om inzicht te krijgen in de huidige werkstructuur in de praktijken en behoeften voor de toekomst, om de mondhygiënisten beter voor te bereiden om over hun professionele socialisatie model in de praktijk te onderhandelen.

Als laatste, op maatschappelijk niveau lijkt de taakherschikking in mondzorg een doel op zich in plaats van een middel te worden; de aanbeveling is om aandacht voor discussie over welke professie zich met welke taken bezig moet houden te verschuiven naar een dialoog over de vraag hoe we de beste en de meest efficiënte zorg aan de patiënten kunnen bieden. Ter inspiratie sluit dit proefschrift af met enkele scenario's voor mogelijke samenwerkingsvormen. Deze zouden nader onderzocht moeten worden op effectiviteit voor de patiënt, werktevredenheid van betrokkenen, en efficiëntie.